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REVISION OF THE RHIPIPHORIDAE OF NORTH AND CENTRAL AMERICA (COLEOPTERA)

BY

EZEKIEL RIVNAY

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CONTENTS

INTRODUCTION

The Rhipiphoridae are comparatively rare insects, and many species belonging to this family were originally described from one specimen. Several species are still represented by a single specimen, the monotype. Because of the rarity of this group of

[1] Submitted as part of the requirements for the degree of Master of Science at the Massachusetts Agricultural College, Amherst.

insects, few students treated and studied it, and, as a result, the taxonomy of this family has been unsatisfactory, especially in the United States. Of all the Rhipiphoridae listed in Leng's Catalogue, about 12% were described after the days of Leconte and Horn, while in many other groups the percentage of recently described insects is considerably greater. The literature of this family also reveals the lack of definite conclusions as to the validity of certain species and varieties. This is due, naturally, to the fact that several species were described from single specimens. There has existed also a diversity of opinion as to the proper names of certain genera, and their correct position in the family.

The present paper is the result of an attempt to bring this family into better taxonomic order. The author does not claim to have settled all the difficulties that are involved in the taxonomic study of this group; on the contrary, he frankly admits that considerable work is still to be done. But in preparing this paper he has attempted to do the following: (1) To study the different species already described and wherever it seemed necessary, redescribe such species or make additional references to characters which have been omitted in the original descriptions, with the hope that the student may more easily determine his material; (2) to find definite means of correlating the two sexes and describe the other sex in cases where it has not heretofore been known; (3) to describe new forms, based on undetermined material or upon wrongly identified specimens found in the various collections; (4) to divide the family properly, and base the division upon morphological features and biologic characteristics as far as possible; and (5) to collect scattered important data in regard to the biology of the group.

To accomplish the above the writer has studied the types or paratypes of such species as could be obtained in the eastern states. For that purpose he has visited Boston, Washington and Philadelphia. In addition, several collections were kindly placed at his disposal in the American Museum of Natural History, where a taxonomic study as well as a morphologic comparison of the group has been pursued.

The material studied was obtained from the following sources: American Museum of Natural History, through Dr. F. E. Lutz

and Mr. A. J. Mutchler:—American Museum Collection, containing the Henry Edwards, Charles Palm and other collections. Mr. Charles W. Leng, Director, Public Museum, Staten Island, N. Y.:—Mr. Leng's private collection. Mr. William T. Davis, Staten Island, N. Y.:—Mr. Davis' private collection. Mr. Howard Notman, Brooklyn, N. Y.:—Mr. Notman's private collection. Museum of Comparative Zoology, Cambridge, Mass., through Mr. Nathan Banks:—The Leconte, Bowditch and other collections. Mr. Charles Schaeffer, Brooklyn Museum, Brooklyn, N. Y.:—Mr. Schaeffer's private collection. Mr. C. H. Frost, Framingham, Mass.:—Mr. Frost's private collection. U. S. National Museum, through Dr. J. M. Aldrich, Dr. E. A. Chapin and Mr. H. S. Barber:—specimens from Pierce, Schwarz, Hubbard Green, Casey and other collections. Academy of Natural Sciences of Philadelphia, through Mr. E. T. Cresson, Jr.:—the Horn, Mason and other collections.

To all of the above institutions and private collectors, I wish to extend my sincere thanks. I also wish to express my appreciation to those members of the staffs in the above-mentioned institutions who have so willingly assisted me in my work.

As stated above, this paper was prepared at the American Museum of Natural History and it is to this institution that I am deeply grateful for the privilege of using the Entomological Laboratory and its facilities. I cannot fully express my sincere thanks to Dr. F. E. Lutz, Curator of Entomology, to Mr. H. F. Schwartz and Miss Jeanette Alexander of that department, for the kind manner in which they have assisted me, nor to Mr. A. J. Mutchler who has followed this work and assisted me in getting together literature and checking up references relating to the several species. At this moment I cannot but repeat the words of Mr. C. W. Leng in his introduction to the bibliography of his famous Catalogue, which are as follows: "I am under heavy obligations to Mr. Andrew J. Mutchler, of the American Museum of Natural History, for continual assistance in preparing this bibliography. His knowledge of the great collection of books in that Museum is remarkable. I am glad to gratefully acknowledge his help." I am also under obligation to Drs. H. T. Fernald, C. P. Alexander and G. C. Crampton, who have read the manuscript and offered many helpful suggestions.

History of the Family

Linné described in 1761 the European *Metoecus paradoxus* and placed it in the genus *Mordella*. In later editions of his Systema Naturae, and in the Systema Entomologiae of Fabricius (1775) a few species of *Macrosiagon* (Rhipiphoridae) were also included in the genus *Mordella*. Bosc first described *Rhipiphorus subdipterus* in 1792. The derivation of the generic name is from the Greek, Ῥῖπις *a fan* and φορος *bearing*, and the name was suggested to him by the fan-shaped antennae of the male. In addition to the detailed description, there are also figures that indicate clearly the species he described. In his discussion, Bosc states that the *R. subdipterus* has some characteristics in common with *Apalus 2-maculatus* (Meloidae) and with *Necydalis humeralis* (Cerambycidae). The similarity with the latter is, as we may understand, superficial. Bosc expresses his opinion as to the position of *Rhipiphorus*, and states that it should be placed near *Mordella*, with which it has many characteristics in common. In later works of Fabricius, his Entomologia Systematica (1792) and his Systema Eleutheratorum (1801), we find the early-described Rhipiphorids separated from the Mordellids, and together with *subdipterus*, included in the genus *Rhipiphorus* Bosc. Of the species listed there, we find four from North America, namely, *limbatus*, *dimidiatus*, *pectinatus* and *6-maculatus*.

The genus *Rhipidius* was described by Thunberg in 1806, while *Pelecotoma* was described by Fischer von Waldheim in 1809. In 1830, Hentz separated the genus *Macrosiagon* from *Rhipiphorus*, and designated *R. dimidiatus* as the genotype. A new genus was added to the group when Guerin described *Evaniocera* in 1835. In his Catalogue, Dejean, in 1834, listed among other Rhipiphoridae a group of insects in the genus *Trigonodera*, and Castelnau, in 1840, described a new genus *Pelecotoides*. All the authors mentioned treated the group as belonging to the family Mordellidae. In 1855, Gerstäcker wrote his excellent monograph on the Rhipiphoridae and separated them from the Mordellids. This separation was based on the following characteristics: The Rhipiphorids are parasitic; their sexes antigenous; antennae flabellate or pectinate, with their insertion near or above the eyes and not below them; last segment of maxillary palpi not hatchet-

like, and pronotum without distinct lateral carina and suture. He divided the family into four tribes representing twelve genera as follows:

I. Ptilaphorini—(1) *Trigonodera*, (2) *Geoscopus*, (3) *Pelecotoma*, (4) *Clinops*, (5) *Ancholaemus*, (6) *Euctenia*, (7) *Ptilaphorus*, (8) *Ctenidia*.
II. Rhipidiini—(9) *Rhipidius*.
III. Myoditini—(10) *Myodites* (Rhipiphorus).
IV. Rhipiphorini—(11) *Metoecus*, (12) *Rhipiphorus* (Macrosiagon).

The family was treated afterwards by Lacordaire in 1859, and by other authors in connection with description of local faunas.[2] New genera have since been added to the family, so that we have today the group as represented in the Catalogus Coleopterorum, W. Junk, Pars 54, 1913. E. Csiki, who arranged the group for this Catalogus divided the family into three tribes as follows:

I. Pelecotomini—seventeen genera.
II. Rhipiphorini—three genera, namely, *Macrosiagon*, *Metoecus* and *Rhipiphorus*.
III. Rhipidiini—seven genera.

In America, we find in the Catalogue of Insects of Pennsylvania, by Fred. Val Melsheimer, 1806, page 56, nine species in the genus *Kipiphorus*. No doubt the "K" is due to a typographical error and should be replaced by *R*. Some of those names we find published later in 1846 by his son, F. E. Melsheimer, but most of them are now either synonyms or varieties of *pectinatus* Fabricius. Thomas Say, in 1823, described the first American species of the genus *Rhipiphorus*, namely, *Dorthesia fasciata*, and Leconte, in 1868, described the genus *Toposcopus*. Other authors who contributed to the literature of American Rhipiphoridae by adding new species from North and Central America were Germar (1824), Newman (1838), Guerin (1844), Gerstäcker (1855), Horn (1875 and 1892), Champion (1899), Pierce (1902–1920), and Fall (1907). Horn, in 1875, monographed the genus Macrosiagon

[2] For reference to these see Rhipiphoridae, E. Csiki—Catalogus Coleopterorum—W. Junk, Pars 54, 1913.

(as Rhipiphorus), and Champion treated the species of the entire family found in Central America; while Pierce, in addition to taxonomic notes on the genus *Rhipiphorus* recorded some valuable ecological notes and observations, and added important facts to our knowledge of the life history of the family.

Morphology

To the student of comparative morphology, the Rhipiphoridae present a very interesting study, because this group includes ordinary Mordelloid beetles on the one hand, and highly specialized Strepsipteroid beetles on the other. In this family, therefore, one may find intermediate stages between the Coleoptera and Strepsiptera.

Early taxonomists believed that some groups which are included in the Rhipiphoridae have little relationship to each other; they thought that the grouping of this family was based on superficial characteristics; Sharp and Muir for instance, grouped the genus *Pelecotomoides* (*Trigonodera*, Rhipiphoridae) in the Mordellidae. Those authors may have been right to a certain extent, as will be shown later, but there are certain tendencies occurring in the entire family, that make it into a unit. In addition there existed also a diversity of opinion as to the proper division of this family. It is therefore the aim of the following paragraphs to discuss the similarity and differences of the various genera from a morphological view point, and conclude as to their possible phylogeny and proper classification. Because of lack of material, only the genera occurring in the United States have been studied, although other exotic genera are mentioned to make the discussion more complete. In the following discussion the minute details, and minor differences of parts are omitted; only the general form and structure of certain organs are discussed.

Antigeny.—(Pl. I, fig. 1–6 C; Pl. III, fig. 4.) In every genus included in the Rhipiphoridae the antennae in the two sexes are of a different form, and therefore represent the most important secondary sexual characteristic. Nothing in addition to this is found in the genera *Pelecotoma*, *Trigonodera* and *Toposcopus*. In *Macrosiagon*, however, the males of some species may differ in color from the females; and in *Rhipiphorus*, the males, in addition

to the difference in color, have their tarsal claws more finely and closely pectinate than those in the females. In the genus *Rhipidius* (fig. 4) the female is without elytra and wings, and seems to be of an entirely different form than that of the male. The Stylopid females have lost, in addition to the wings, also the legs and other important organs. In antigeny, therefore, *Rhipidius* approaches very much the Strepsiptera.

Head Capsule.—(Pl. I, fig. 1–6 A, B.) In the less specialized genera, *Pelecotoma* and *Trigonodera*, the head is broadly round, and the vertex is on the same level with the anterior margin of the pronotum. In *Toposcopus* and *Rhipidius* the vertex is but slightly elevated above the margin of the pronotum, while in *Macrosiagon* and *Rhipipiphorus* it is much more elevated. The relative size of the sclerites of the head differs in the genera. In making this comparative study, one should bear in mind the demarcations used in Comparative Morphology of insects in general. The epicranial suture, and its arms which separates the vertex from the frons are of great importance. This suture is not noticeable in some species, while it is distinct in others.

Upon comparing the respective figures, one may readily see that the frons in *Pelecotoma* (fig. 1 B) is much enlarged and is not distinctly separate from the vertex, while in *Trigonodera* (fig. 2 B) and *Toposcopus* (fig. 3 B) it is much smaller. In some species belonging to the genera *Macrosiagon* and *Rhipiphorus*, the epicranial suture is visible; when it is present in *Macrosiagon*, as it is in the case of *M. octomaculatum* and *M. sayi*, it may be seen when looking upon the head from the rear (see Pl. III, fig. 16). The arms of the suture are along the carina; in other words, the entire frontal surface of the head is the clypeo-frons, and in some species a small part of it is the vertex. When present in *Rhipiphorus* as it is in the case of *Rh. scaber* and *Rh. simplex*, the suture is seen on the conical process between the antennae and its arms in front of the tubercle. In other words, this process is the true vertex, and the entire broad surface between the large eyes is the clypeo-frons. In the last two mentioned genera, therefore, the anterior sclerites of the head have enlarged very much, while the posterior sclerites, the occiput and vertex, have become much smaller. This change in the head capsule causes the apparent change of position of the eyes and antennae as will be seen in the next paragraphs.

Eyes.—(Pl. I, figs. 1–6 A, B.) The size and form of the eyes varies not only in the genera, but also in the species of one genus. One could readily point out, however, the outstanding eye characteristics of the groups. While the eyes in *Pelecotoma* (fig. 1, A, B) are small and widely separate, they are much larger, much closer to each other, and more coarsely granulate in *Trigonodera*. The eyes in *Toposcopus* are finely granulate, almost entirely divided, and the line connecting the two divisions is obsolete of facets. In all the three genera mentioned the eyes are emarginate to some degree. In the genera *Macrosiagon* and *Rhipiphorus* (figs. 5 and 6, A, B) the eyes are very finely granulate, regularly oval, not emarginate, situated on the sides of the head, and leaving a wide clypeo-frons. Upon comparison, one may readily see that the eyes of *Macrosiagon* are proportionately much smaller than the eyes of *Rhipiphorus*. The male of *Rhipidius* (Pl. I, fig. 4 A, B) has the eyes larger, subcontiguous, with the facets large and distinct. In the supposedly female *Rhipidius* (Pl. III, fig. 4 A) the eyes are very small, situated on the side of the head, the facets few and distinct, as is the case in the eyes of the male Strepsiptera which are berry-like.

Antennae.—(Pl. I, fig. 1–6 C.) As a rule the antennae are eleven-segmented, but in some cases the last segment is obsolete. In the males of *Pelecotoma* and *Trigonodera* the antennae are pectinate. The segments are elongate, and the short rami, therefore, are widely separated from each other. The female antennae are much like those of the male, except that the processes of the segments are much shorter than those of the male antennae. The first segment in this type of antenna is much thicker and larger than the rest, while the second is the smallest. The number of the processes varies in the species, some having eight while others seven or six, that is, in addition to the first and second; some other segments are without any processes. In *Toposcopus*, the male antennae are of an entirely different type. The first segment is the largest, and the second smallest; but the third segment is also large and bears a process at its proximal end, while the remaining eight segments are very closely compact and their rami are very long and close together (see fig. 3 C). The female antennae of *Toposcopus* are like those of *Trigonodera*,

except that the third segment indicates traces of a process. The same type of antenna is found in Evaniocera, and as far as I could make out from the drawing, also in *Ancholaemus*. In the male of *Rhipidius* the antennae are of the same type as in *Evaniocera*, except that the rami are broader, lamellate-like, and the third segment is smaller and without a process. In the supposedly female *Rhipidius*, the antennae are filiform. In the males of the genera *Macrosiagon* and *Rhipiphorus* we find the third type of antenna, namely those of the male are biflabellate, every segment bearing two rami, and pectinate in the female. In the male of *Macrosiagon* the first segment is large and the second is distinct, while in *Rhipiphorus* the first segment is broad and short, and the second is very short and sometimes quite indistinct. The length of the rami varies in the species of one genus, but as a rule they are longer in Rhipiphorus than in Macrosiagon. In both genera, they are straight or curled. The female antennae in both genera vary from deeply serrate to pectinate. In some cases the processes are equal while in others they increase in length toward the apex or toward the base. In the female *Rhipiphorus* the last segments show a tendency to fuse, and in most cases the eleventh segment has disappeared.

Pronotum.—(Pl. I, fig. 1–6 A). In the genus Pelecotoma (fig. 1 A) the prothorax has a distinct suture separating the pronotum and pseudopleuron; this suture is present also in other members of this family, but is obsolete in all other genera represented in the United States. In Trigonodera and in Toposcopus the pronotum shows a distinct lateral carina near the base only, but the sides are more or less rounded at the anterior part of the pronotum. In the genus *Rhipidius* the pronotum has become much smaller in comparison with the head, and has a distinct lateral carina; in the two other genera, *Macrosiagon* and *Rhipiphorus*, the pronotum is very broad while the pseudopleuron is quite small, and is represented only by a narrow projection. In the last two named genera, the mesoscutellum is usually under the posterior lobe of the pronotum.

Metanotum.—Because of the enlarged wing muscles, the metathorax is enlarged in most Coleoptera, but is developed more than the average in the genera *Macrosiagon* and *Rhipiphorus*, and

exceedingly so in the genus *Rhipidius*. The metanotum, being uncovered, is much more chitinized than is the case in other genera where the elytra cover the entire body. The median groove on the metascutum is obsolete in these genera, since the elytra are short or dehiscent. In the male *Rhipidius* (Pl. III, fig. 4 V) the metathorax is very large, while the prothorax (fig. 4 A) is very small; this is noteworthy, because in the Strepsiptera the prothorax is very narrow, collar-like, and the metanotum forms the greater part of the body.

Elytra.—The elytra in the genera *Pelecotoma*, *Trigonodera* and *Toposcopus* are of ordinary form, as in other Coleoptera. In the genus *Macrosiagon* the elytra are little reduced, but are dehiscent and attenuated posteriorly, while in *Rhipiphorus* they are much more reduced, becoming convex, scale-like appendages. The elytra of *Rhipidius* are narrower, more hairy, and of softer texture than those of the other two genera mentioned, seeming to approach the form of the club-shaped elytra of the Strepsiptera.

Wing Venation.—(Pl. III, fig. 2–7 W.) As in all other Coleoptera the costa, subcosta, radius and their branches, are crowded together and occupy a small area along the anterior margin of the wing. The median, cubitus and the anal veins occupy the greater part of the wing surface. In the genus *Trigonodera* (fig. 2 W) the wing venation is like other Mordelloid beetles. The vein CuM_4 is quite distinct, with the recurrent vein M present. Also some radial branches are present and the anal branches are evident. In the genus *Evaniocera* (fig. 7 W), which is closely allied to *Toposcopus*, the cubitus is a little curved before it unites with the median (M), but both are distinct, while the anal veins are reduced in number. In *Rhipidius* all the veins have disappeared except at the base and the cubitus (Cu) is the only distinct one. In the two genera, Macrosiagon and Rhipiphorus, a reduction of the number of veins is also noticeable; but they are replaced by secondary thickenings of the wings through depositions of chitin as is shown in figures 5 and 6 W.

Abdomen.—(Pl. III, figs. 4, 5 and 6 V.) As in other Coleoptera, modifications in the structure of the first abdominal segments have taken place. The first segment is membraneous, and is visible only when the abdomen is detached from the metathorax.

In the females of *Macrosiagon* and *Rhipiphorus* the eighth segment is in the form of a tube which surrounds and protects the ovipositor (Pl. II, 5 F, and 6 F). The seventh tergites in *Macrosiagon* is considerably enlarged, shield-like, and is termed the pygidium. In the male of this genus the eighth tergites is the pygidium. In both genera the sternites are quite large and cover the pleurites at their margin. The abdominal segments in *Macrosiagon* are arranged telescope-like and are compressed, while they are depressed in Rhipiphorus. The male abdomen in *Rhipidius* (fig. 4 V) is very small, as is the case in many Strepsiptera, and that of the supposed female has eight distinct segments.

Male Genitalia.—(Pl. II, figs. 1–6 M.) In the male genitalia of Coleoptera we distinguish the tegmen, composed of a basal piece and two lateral lobes which, as a rule, are variably modified. The median lobe, according to Sharp and Muir, is the central portion of the aedeagus in which the median orifice is situated. In the family Rhipiphoridae we find two types of structure in the genitalia. The one is the type which we find in the genera *Pelecotoma*, *Trigonodera*, and with slight modifications in *Macrosiagon* and *Rhipiphorus*. In general the median lobe is long, curved, and the tegmen consists of a large basal sclerite on the dorsal aspect of the median lobe and with a pair of highly modified lateral lobes. The lateral lobes are richly chitinized; they are elongate and slightly curved in *Pelecotoma* (fig. 1 M) and crescent-shaped in *Trigonodera* (fig. 2 M). In *Macrosiagon* (fig. 5 M) the left lobe is as a rule modified into a hook-like projection, while in *Rhipiphorus* they are flat and of the shape presented in fig. 6 M. The common feature in the genitalia of these genera is that the median lobe is quite differentiated from the tegmen, which envelops it.

The other type of genitalia is the one which we find in the genus *Evaniocera* and *Toposcopus*. This type, according to Sharp and Muir, is characteristic also of the genus *Anaspis*. In this latter, quoting Sharp and Muir, "The median lobe is slender, tubular and semi-chitinous, and with median orifice at tip. Tegmen consisting of pair of pointed lateral lobes consolidated at their base, and a narrow, long basal piece." From figure 3 M and 7 M we can see that the male genitalia of *Evaniocera* and *Toposcopus* are

of this type and therefore quite different from the genitalia in the other genera. In *Evaniocera* the tegmen is broader, the median lobe points ventrally with the median orifice at its dorsal side; in Toposcopus as the figures show, the tegmen, median lobe and lateral lobe are very slender and semi-chitinized.

Female Genitalia.—(Pl. II, figs. 2, 5, 6 and 7 F.) The female genitalia of *Trigonodera* and *Evaniocera* do not differ very much from each other as do the male genitalia in these genera. In both, the style, coxites, etc. are distinct. In the genera *Macrosiagon* and *Rhipiphorus* the genitalia have become much more chitinized and the delicate styli have disappeared. This may be explained by the fact that the females oviposit in the ground, and need, therefore, smoother and harder ovipositors. That difference in structure of the ovipositors suggests also that in the genera *Trigonodera* and *Evaniocera*, the females do not oviposit in the ground.

Classification and General Description of the Family

The family Rhipiphoridae according to the classification of Leconte and Horn belongs to the series Heteromera, which is differentiated from other Coleoptera by the fact that the hind tarsi have only four segments. In this series, it belongs to the group of families which are known to have the front coxal cavity open behind. Of these the families Melandryidae, Pythidae and Oedemeridae, have the head not strongly constricted behind the eyes, while the Mordellidae, Anthicidae, Pyrochroidae, Meloidae, and Rhipiphoridae, have it strongly constricted behind the eyes. The Mordellidae and Rhipiphoridae have the pronotum as wide at base as the elytra, while the remaining three families have the base of the pronotum narrower than the elytra. To differentiate them from the Mordellidae, the Rhipiphoridae have the sides of thorax rounded, at least at the anterior part, the antennae flabellate, pectinate, or deeply serrate (with exception of the females of Rhipidius), and the last segment of maxillary palpi not hatchet-like. The Rhipiphoridae seem to be more closely related to the Meloidae than to the Mordellidae, since they both are hypermetamorphic in their development, and members of both groups are parasitic in their immature stages upon other insects.

Adding a few features to the above we may summarize the char-

acteristics of the Rhipiphoridae as follows: Head as a rule vertical, constricted at base, neck inserted in prothorax; antennae, with some exceptions, inserted between the eyes or above them, and usually flabellate, pectinate or deeply serrate. Pronotum at base as wide as elytra, and without a sharp lateral carina; no distinct suture, with some exceptions, separating the pronotum from the pseudo-pleuron; anterior coxa prominent and conical, coxal cavities open behind. Elytra in some cases cover the entire abdomen, while in the more specialized forms they are reduced. Claws pectinate or bifid, seldom simple. Development hypermetamorphic.

From all the facts concerning the general morphology of the various genera of this family, we may divide it as follows:

PELECOTOMINAE

Vertex not elevated above anterior margin of pronotum. Male antennae pectinate, rami separate from each other and shorter than head, at least first three segments without any process. Median lobe quite elongate, lateral lobe modified. This subfamily will include *Pelecotoma*, *Trigonodera*, and others with such characteristics.

EVANIOCERINAE

Vertex little elevated above anterior margin of pronotum. Male antennae monoflabellate, rami longer than head, compact, third segment with a process, which may be reduced. Female antennae deeply serrate, third segment with reduced process. Male genitalia of slender form, in which the median lobe is closely surrounded by tegmen and lateral lobes reduced to small pointed projections. This subfamily includes *Toposcopus*, *Evaniocera*, and probably also *Clinops*, *Ancholaemus* and other genera with the same characters.

RHIPIPHORINAE

Vertex distinctly elevated above anterior margin of pronotum. Male antennae bi-flabellate; female antennae monopectinate. Elytra reduced in size. Median lobe elongate. Ovipositor heavily chitinized, pointed and smooth. This subfamily includes *Rhipiphorus*, *Metoecus* and *Macrosiagon*.

RHIPIDIINAE

Male antennae monoflabellate, rami long and close together. Female wingless. This subfamily would include *Rhipidius*, *Rhysostylops* and other genera which have the same characteristics.

Key to the Genera of Rhipiphoridae of North and Central America

1. Elytra long, covering the entire abdomen and the folded wings. Antennae inserted below middle of eyes.....2
   Elytra short, dehiscent; wings partly or entirely exposed. Antennae inserted near middle of eyes or above them.....4
2. Eyes divided, the two divisions of each eye connected by a strip of non-faceted corneous membrane.....**Toposcopus**
   Eyes entire or emarginate.....3
3. Small insects, not over 6 mm.; eyes small; claws not pectinate but provided with two minute denticles.....**Pelecotoma**
   Large insects, over 6 mm.; eyes large; claws pectinate.....**Trigonodera**
4. Elytra reduced to scale-like convex plates, not extending beyond second abdominal segment; claws pectinate.....**Rhipiphorus**
   Elytra longer, dehiscent; posterior lobe of pronotum covering scutellum; tarsal claws bifid.....**Macrosiagon**

PELECOTOMA Fischer von Waldheim

1809. *Pelecotoma* Fischer von Waldheim, Mem. Soc. Nat. Mosc., p. 293.
1823. *Pelecotoma* Fischer von Waldheim, Entomogr. Russ., II p. 170.
1855. *Pelecotoma* Gerstäcker, Rhipiph. Col. Fam., p. 8.
1859. *Pelecotoma* Lacordaire, Hist. Ins. Col., V p. 619 and 622.

Small insects, not over 5.5 mm. Elongate and subparallel, punctured and covered with silky hair. Head bent down, vertex broadly rounded, not elevated above anterior margin of pronotum. Eyes comparatively small, emarginate; antennae 11-segmented, situated below eyes, pectinate in the male, deeply serrate in the female. First three segments in both sexes without any processes. Pronotum strongly tapering toward the front, slightly emarginate on both sides to produce a rounded broad lobe, but short and not sufficient to cover scutellum. Hind angles not very prominent, lateral carina distinct at base, lateral suture present, separating the pseudopleuron from disc. Elytra long and narrow, and cover entire abdomen. Abdomen depressed, legs short, claws very small, not pectinate, but armed with two minute denticles.

GENOTYPE: *Pelecotoma fennica* (Paykull). Paykull described *fennica* as *Rhipiphorus* in 1799. In 1809 Fischer von Waldheim described the genus *Pelecotoma* with the species *mosquensis* belonging to it, but the latter has been placed in the synonymy of *fennica*.

Two species have been recorded belonging to this genus, *P. fennica* (Paykull) in Europe, and *P. flavipes* Melsheimer in North America.

Pelecotoma flavipes Melsheimer

1846. *Pelecotoma flavipes* Melsheimer, Proc. Acad. Nat. Sci. Phila., II, p. 318.
1855. *Pelecotoma flavipes* Gerstäcker, Rhipiph. Col. Fam., p. 9.

This species may be distinguished from *Pelectoma fennica* as follows: The legs of *P. fennica* are of the same color as the elytra, and the pronotum is of a darker shade while the legs of *P. flavipes*, as mentioned, are yellow and the pronotum is of the same shade as the elytra. The specimen of *fennica* in Mr. Leng's collection is larger than any of the *flavipes* examined.

Black or brown, mouthparts and legs yellowish; elongate, sides subparallel. Head broadly rounded, sparsely punctate and pubescent. Eyes emarginate near middle, frons broad, clypeus truncate. Antennae 11-segmented, the first three segments without process and pale, the others bear processes and are fuscuous, fourth segment bears a process usually shorter than the following; processes of female antennae short, compact and acute at tip, those of male long and rounded.

Pronotum strongly tapering toward front, conical, pubescent, base indented on each side to produce a broad posterior lobe. Elytra long, narrow, covered with silky pubescence, abdomen depressed.

Length, 4 to 5 mm.

Distribution.—Melsheimer described the species from specimens taken in Carolina; the specimens examined seem to be distributed along the Atlantic Coast and more in the northern states than in the southern.

MAINE: Monmouth, July, [Frost Collection].

NEW HAMPSHIRE: Contoocook, July, [Schaeffer Collection; (E. and G. Wheller), Frost Collection].

MASSACHUSETTS: Tyngsboro, (Blanchard), [M. C. Z.; Schaeffer Collection]. Petersham, July, [Frost Collection]. "Mass.", [Leng Collection; A. M. N. H.].

NEW YORK: [Casey Collection; U. S. N. M.].

NEW JERSEY: [Schaeffer Collection].

NORTH CAROLINA: Black Mountains [Leng Collection; A. M. N. H.].

OHIO: Cincinnati, (H. Soltau), [U. S. N. M.].

MICHIGAN: Marquette, [Hubbard and Schwartz Collection].

Biology.—We know nothing of the biology of *P. flavipes.* As for the ecological surroundings, we know that it is taken by sweeping in July. Since it is so similar to the European *fennica,* which is also taken in July and is also found under similar climatic conditions, we may infer that it's life history and biology may also be similar to *fennica.*

In regard to the biology of the latter, Schuman (1899) records that he collected the *P. fennica* during the end of June and the beginning of July in holes of Ptilinus *pectinicornis* L. and of *Trypoxylon clavicornus* Lep., and it is probably parasitic on the latter. The genus *Trypoxylon* is found in America, and probably our species may be parasitic on the same.

TRIGONODERA Dejean

1834. *Trigonodera* Dejean, Cat. Col., Ed. 1833, p. 217.
1840. *Pelecotoides* Castelnau, Hist. Nat. Ins., Col., II, p. 263.
1855. *Trigonodera* Gerstäcker, Rhipiph, Col. Fam., p. 2.
1859. *Trigonodera* Lacordaire, Hist. Ins. Col., V, p. 619.
1891. *Pelecotomoides* Champion, Biol. Cent.-Amer., Col., IV, pt. 2, p. 350.
1901. *Caspyria* Fairmaire, Rev. Ent., p. 194 and 248.
1904. *Pelecotomoides* Schaeffer, Jour. N. Y. Ent. Soc., XII, p. 231.

Larger species; elongate; head comparatively small, vertex not elevated above anterior margin of pronotum. Eyes large and in some species subcontiguous; antennae with eleven segments, usually situated below middle of eyes, pectinate in the male, and deeply serrate in the female. Mandibles are not large, lacinia of maxillae broad and short. Pronotum very broad at base, and strongly tapering anteriorly, lateral margins curved, lateral carina distinct at base only, lateral suture obsolete; hind angles acute but not prominent. Elytra elongate, covering the entire abdomen. Tarsal claws serrate.

GENOTYPE: *Trigonodera leachii* (Latreille).

A diversity of opinion has existed as to the proper generic name of this group of insects. In 1833–1834, Dejean published the catalogue of his insect collection, in which he placed *Pelecotoma leachii* Latreille, together with a group of undescribed species from Brazil, in the genus *Trigonodera.* Castelnau in 1840 described the same genus as *Pelecotoides* with the species *maculata, gigantea, strigata,* etc. Gerstäcker, however, used the generic name *Trigo-*

nodera and was followed by Lacordaire, while Gemminger and Harold replaced it by *Pelecotomoides* the amended name of Castelnau. This name has been somewhat generally used by later authors but Leng changed it to the original spelling. Because of its priority, and because of the validity of one of the species included in the genus *Trigonodera* Dejean, that name should stand, and is therefore used in this paper.

Csiki lists about forty species, most of them taken South of the Equator, both in the Eastern and Western Hemispheres; a few species have been taken in Central America but only one north of Mexico. The following is a key to the species of North and Central America.[3]

Key to the North and Central American Species of Trigonodera

1. Eyes very large, coarsely granulated, subcontiguous, antennae with four basal joints simple.....2
   Eyes smaller, more finely granulate, and distant from each other in front...3
2. Frons with a glabrous area between base of antennae; rami in the male shorter than the first four segments; in the female shorter than the third and fourth segments taken together.....**schaefferi**
   Frons thickly pubescent, rami of male antennae as long, or longer than the first four segments taken together; in the female as long or longer than the third and fourth segment taken together.....**nubila**
3. Antennae with the three basal joints simple.....**lineata**
   Antennae with the five basal joints simple.....**bivittata**
   Antennae with the four basal joints simple, the fifth acutely produced within **nebulosa**

Trigonodera nubila Gerstäcker

1855. *Trigonodera nubila* Gerstäcker, Rhip. Col. Fam., p. 4.
1891. *Pelecotomoides nubilus* Champion, Biol. Cent.-Am., Col., IV, pt. 2, p. 351.

Elongate, brown covered with silky pubescence varying from golden-yellow to brown, sometimes variegated.

Head inserted in thorax to the eyes, vertex round, finely punctate and pubescent. Eyes coarsely granulated, very large, subcontiguous, especially in the males, being separated by a very narrow strip of chitin. Frons punctate and pubescent. Clypeus and labrum quadrangular, their anterior margins sometimes yellow and smooth. Mandibles curved, black and smooth at tip, pubescent on the sides near base. Antennae pectinate with the first four segments simple; the first segment longest and thickest, third segment longer than the second or fourth, which are subequal. In the male the processes are broad at tip and longer than the first

[3] This is slightly modified from Champion's key.

four segments taken together; in the females the processes are acute and slightly longer than the third and fourth segment taken together.

Pronotum at base wide, lateral sides curved, anterior margin very narrow. Posterior lobe broad truncate, and two slight depressions on each side at base. Hind angles slightly produced. Elytra long and narrowly rounded at tip.

Length, 6.5 to 12 mm.

Distribution.—Gerstäcker described the species from Peru, and Champion records it from Mexico, Nicaragua and Panama.

The specimens studied were the following:

Mexico: Venodio Sin, (Kuche). [U. S. N. M., 12 ♂], Jicaltepec, Vera Cruz, March, [F. C. Bowditch Collection, 2 ♀].

Trigonodera schaefferi new name

1904. *Pelecotomoides nubilus* Schaeffer, Jour. N. Y. Ent. Soc., XII, p. 231. (non Gerstäcker 1855).

Mr. Schaeffer did not compare his specimens with the true *T. nubila* Gerstäcker. Upon comparison with some males supposedly of the latter in the National Museum and two females in the Museum of Comparative Zoology, I find this species to be quite different. The two may be separated by the following: *T. schaefferi* has a smooth glabrous area in front between the antennae while *T. nubila* Gerstäcker has the entire clypeo-frons thickly pubescent. In the male of *T. schaefferi* the ramus of the fifth segment is shorter than the first four segments combined, while the *T. nubila* has it equal or longer than the four segments. In the female of *T. schaefferi* the process of the fifth segment is shorter than the third and fourth segments combined, while *T. nubila* has it equal or longer. In one female the eyes are not so close to each other as with other females. This characteristic varies apparently in the individuals. *T. schaefferi* is the only species of this genus in the United States, since no other specimens of *T. nubila* were found north of Mexico.

Elongate, subparallel, brown, covered with golden yellowish pubescence. Head, small, eyes very large, subcontiguous, occupying entire head, leaving a smald rounded vertex and a very small front. Clypeus truncate at apex, punctured and hairy, with a small, elongate, smooth area between the antennal sockets; labrum truncate and hairy; mandibles very curved. First four segments of antennae without process, first and third segments longer than second and fourth. Male antennae pectinate, first ramus shorter than the first four segments taken together, also shorter than other rami; female antennae deeply serrate, first process shorter than third and fourth segments taken together. Pronotum conical,

broad at base as long, sides much curved, and anterior margin narrow, posterior lobe broadly rounded, and very slightly truncate. Scutellum longer than broad, quadrangular. Elytra long, slightly tapering toward apex, rounded at tip. Second segment of hind tarsus slightly longer than third.

Length, 5.5 to 9.5 mm.

Holotype.—Male; Esperanza Ranch, Brownsville, Texas, (C. Schaeffer). [Schaeffer Collection.]

Allotype.—Female; Same data as holotype, [Schaeffer Collection].

Distribution.—This species has been collected in Esperanza Ranch, Brownsville, Texas, June–July by Mr. Charles Schaeffer and May–June by Mr. H. S. Barber. Paratypes with the same locality label are also in the U. S. National Museum (No. 41864), Leng, and Frost Collections. Mr. Schaeffer, (1904), taking it as *nubilus*, writes the following:

"A small number of this interesting Rhipiphorid were beaten from different trees at Esperanza Ranch, most of them in July. Specimens are recorded from Panama as having ill-defined transverse or oblong patches of a fuscous color but all my specimens belong to the unicolorous form. This insect is of a grayish fuscous color, eyes large, divided in front by a very narrow line, antennae with the first four joints simple, the remaining flabellate in the male, strongly serrate in the female. My specimens are from 5.5 to 9.5 mm."

Trigonodera nebulosa (Champion)

1891. *Pelecotomoides nebulosa* Champion, Biol. Cent.-Am., Col., IV, pt. 2, pp. 351, 352.

"Length, 7½ to 11 mm."

Type.—Champion records the species from Taboga, Panama, and Columbia. [British Museum.]

Trigonodera lineata (Champion)

1891. *Pelecotomoides lineata* Champion, Biol. Cent.-Am., Col. IV, pt. 2, p. 351.

According to Champion, *P. lineata* differs from all other species described by Gerstäcker in having the three basal joints only, simple.

"Length, 7¾ to 10 mm."

Type.—Jalapa, Mexico. [British Museum.]

Trigonodera bivittata (Champion)

1891. *Pelecotomoides bivittata* Champion, Biol. Cent.-Am., Col., IV, pt. 2, p. 351, 352; (Chevr. in litt.).

Champion comparing this species with *T. lineata*, makes the following comment:

"Closely resembling the same sex of *P. lineata*, but differing from it by the small non-serrate fourth and fifth joints of the antennae. This specimen has the seventh antennal joint on one side abnormally formed, it being diserrate. Length, 8½ mm."

Type.—Cordova, Mexico. [British Museum.]

TOPOSCOPUS Leconte

1868. *Toposcopus* Leconte, Trans. Am. Ent. Soc., II, p. 54.

Head round, sparsely pubescent, vertex rounded, very little elevated above anterior margin of pronotum. Eyes completely divided, the two divisions connected by corneous membrane destitute of facets. Antennae eleven-segmented, inserted near side of lower division of eye. Third segment about half the length of first, bearing a process shorter than those of the following segments; those of the male flabellate, with long rami of female pectinate with process rounded at tip. Pronotum strongly tapering anteriorly so that its anterior width is about one-third the posterior. Hind angles acute and prolonged, lateral carina prominent near hind angles only. Posterior lobe truncate, scutellum exposed, rectangular. Elytra slightly tapering posteriorly. Claws bifid at tip and with three additional small denticles along the edge, basally.

GENOTYPE: *Toposcopus wrighti* Leconte.

Leconte has pointed out both the differences and similarities between this genus and *Evaniocera*. We need no better comments than his, and it will be best to quote them: " . . . the eyes are divided into two portions connected by a slender line of smooth corneous material, which is destitute of lenses, while in *Evaniocera* they are only deeply emarginate. The third joint of the antennae of the male is longer, with a basal process about four-fifths as long as the processes of the following joints, while in *Evaniocera* the third joint is short, prolonged externally into a process one-fifth as long as those of the following joints. The side margin

of the prothorax is more developed, extending from the hind angles nearly to the apex. The claws are not finely pectinate as in *Evaniocera* but bifid at the tip, and armed with three slight teeth, somewhat as in *Ancholaemus* Gerst . . . . ."

The genus *Evaniocera* is widely distributed in the Eastern Hemisphere, and its representatives have been taken in Europe and Northern Africa as well as in Siberia and Australia, while the one species of Toposcopus has been found so far only in the Southern part of the United States.

Toposcopus wrighti Leconte

1868. *Toposcopus wrighti* Leconte, Trans. Am. Ent. Soc., II, p. 54.
1904. *Toposcopus wrighti* Schaeffer, Jour. N. Y. Ent. Soc., XII, p. 232.

Elongate, brownish-black and black; elytra ferrugineous or brown, covered with grey-golden pubescence. Head opaque, frons with slight impression near antennae, clypeus closely punctured, broadly truncate; mandibles much curved. Antennae of male flabellate, first segment large, black with tips red, second segment small, third larger, subcylindrical bearing the process at its proximal end, four-fifths the length of the following rami, other segments compact with rami close together. Female antennae pectinate and processes round at tip. Pronotum punctured and pubescent in the male, sparsely so in the female. Scutellum quadrangular, of the same color as pronotum, elytra long, punctured, covering entire abdomen; thorax beneath densely pubescent, claws bifid with three denticles.

Length, 6 to 10 mm.

Type.—Male; Tecalote Creek, south of Las Vegas, New Mexico. [Leconte Collection.]

Alloplesiotype.—Female; Texas. [Leconte Collection.]

Distribution.—Leconte described this species from 10 males collected during the survey under General W. W. Wright in New Mexico. Four of the ten males are in the Leconte collection; other males bearing the label "N. M." are in the following collections: Schaeffer,[4] Horn, Hubbard and Schwarz (L. C. V. Riley) and Casey.

In addition to these I examined one male from Arizona in the Palm Collection, one male from Texas in the Casey Collection, and one female from Texas in the Leconte Collection. The female of this species was not known to Leconte at the time he

[4] Mr. Schaeffer informs me that the specimen in his collection was given to him by Henshaw, and is no doubt one of the 10 mentioned by Leconte. Probably the other specimens bearing the same label in other collections are of the same origin.

described it. The one female was added to his collection later on, and is now with the type. This is the only female I have seen of this species, and agrees with the type in all respects except that the thorax is less punctured and pubescent and elytra are darker in color. This female, which was collected in Texas, should be considered as the allotype.

Variation.—The type specimen and some other males have the posterior part of the prothorax beneath, red, while others have it dark. One male in the Casey Collection is of darker shade and considerably larger than the others.

RHIPIDIUS Thunberg

1806. *Rhipidius* Thunberg, Vet. A K. Nya Hand, XXVII, p. 5.
1831. *Symbius* Sundevall, Isis, p. 1230.
1855. *Rhipidius* Gerstäcker, Rhipiph. Col. Fam., p. 14.
1859. *Rhipidius* Lacordaire, Hist. Ins. Col., V, p. 619.

As far as the writer knows, no species of *Rhipidius* have been found on the continent of North America. In the collection of the U. S. National Museum there is one female collected on a steamer in the Panama Canal. This female was identified by Dr. Schwarz as a *Rhipidius*, and on the basis of this record Leng listed it in his catalogue among the Coleoptera of North America. The writer has not made a study of this genus because of lack of material, and does not wish to state with certainty what species this is. However, a short description of this female and some drawings made from it will be of great value in this place, since it is the only record of this genus in this part of the world, regardless of the fact that it may have been brought by its host, perhaps a roach, from another locality. The general characteristics of a male *Rhipidius* are as follows:

"Labial palpi two-segmented, first very small, second large oblong-oval; head globose, flat on vertex, front lineate. Eyes granulate, occupy the entire anterior part of head, narrowly separated on front. Antennae inserted between them. Eleven segments, first cuniform, two to three short, others lamella very long and slender. Prothorax very transverse, or longer than wide, attenuate, slightly biseminated at base, no suture. Scutellum large, transverse. Elytra dehiscent. Legs simple. Claws simple, abdomen oblong, obtuse at end."

The female just mentioned is a small creature about 3 mm. long, brownish-black, and opaque. Head short and broad, frons concave with distinct elevations near the insertion of antennae. Eyes small, granulate, facets distinct, four facets more outstanding than the others. Antennae filiform, 11-segmented. Thoracic segments distinct and subequal, the third one being a little smaller; every one bears a pair of legs not very strong. Elytra and wings obsolete, abdomen 8-segmented with an ovipositor. (Pl. III, 4, 4 A′ and 4 B′).

MACROSIAGON Hentz

1792. *Rhipiphorus* Fabricius, Ent. Syst. II, p. 109.
1830. *Macrosiagon* Hentz, Trans. Am. Phil. Soc., Sec. 2, III, p. 462.
1840. *Emenadia* Castelnau, Hist. Nat. Ins., Col., II, p. 261.
1855. *Rhipiphorus* Gerstäcker, Rhipiph. Col. Fam., p. 19.
1859. *Emenadia* Lacordaire, Hist. Ins. Col., V, p. 627.
1875. *Rhipiphorus* Horn, Trans. Am. Ent. Soc., V, p. 121.
1891. *Emenadia* Champion, Biol. Cent.-Am., Col., IV, pt. 2, p. 353.

Form slightly compressed, broadest across metathorax. Vertex much elevated above anterior margin of pronotum; clypeus usually more sculptured than vertex. Eyes small, oval, prominent. Antennae, which are situated near the middle of the inner margin of eyes, pectinate or deeply serrate in the females, and biflabellate in the males, every segment bearing two rami. In both sexes the first and second segment without any process. Mandibles curved, acute, glabrous, base sometimes pubescent. Maxillae with lacinia filiform and hairy; labrum elongate, round at tip. Pronotum tapering toward front, longer than, or as long as wide at base; base with distinct lobe, which covers the scutellum. No distinct suture or lateral carina between disc and pseudopleuron; the latter narrow and small. Coxae separated in some species by a prosternal spine; in other species this spine is small so that the coxae are contiguous. Elytra dehiscent, tapering toward apex, as long as abdomen or longer. Tip of wings uncovered. Abdomen compressed, sternites much larger than the hard tergites, and curved so that their upper margin extends over pleurites. Front femora indented at apex; hind femora very much compressed, with inner surface glabrous and smooth. Claws bifid.

GENOTYPE: *Macrosiagon dimidiatum* (Fabricius).

Until 1830 the species of this genus were included in *Rhipiphorus*. Hentz separated them on the basis of the lacinia of maxilla which is elongate, their short abdomen, and habits. He designated *M. dimidiatum* as the genotype.

The length of the last tarsal segment varies with the species and serves as a specific characteristic. Some species have a distinct process on pronotum, others have excavations on the disc while others are smooth. The sexes are easily separated by the structure of the antennae. Some species have other distinct secondary sexual characteristics such as colors and markings. The genus may be separated into two groups, the group of *dimidiatum*, with sides of thorax strongly convex and bulging beyond sides of pronotum, and with front coxa contiguous, and the group of *limbatum* with sides of thorax flat and not bulging beyond lateral sides of pronotum, and prosternal spine separating front coxae. In the latter group, the species are usually more shining and less sculptured and the elytra are less dehiscent.

This genus is widely distributed. Species of *Macrosiagon* are found almost in every continent, but as a rule are limited to warm or temperate zones. Of the one hundred and twelve species listed by F. A. Schilder, sixty are from America. In other words, more than half of all the species recorded in this genus are American.

Key to the Species of Macrosiagon of North and Central America

1. Mesepisternum convex, bulging beyond lateral margin of pronotum, anterior coxa contiguous (in some cases only at tip).....2
   Mesepisternum more or less flat, not bulging beyond lateral margin of pronotum; anterior coxae separated by a prosternal spine.....11
2. Posterior lobe of pronotum with distinct process, vertex much elevated, with its front surface concave; second segment of hind tarsus not flat above and subequal to third.....3
   Posterior lobe of pronotum little convex, or with small cup-like concavity at tip, but never with distinct process; vertex without distinct concavity..4
3. Head and thorax brown, tibial spines truncate; wings yellowish-hyaline; antennal processes of female bifurcate (Pl. III, fig. 14).....**fernaldum**
   Head and thorax black, tibial spines acute, wings brown; antennal processes of female acute or truncate. (Pl. III, fig. 15).....**flavipenne**

4. Pronotum with distinct excavations on the disc on both sides.....5
   Pronotum may be slightly depressed near base, but without distinct excavations on the disc.....7
5. Excavations on sides of pronotum very deep, abrupt and triangular. **bifoveatum**
   Excavations on sides of pronotum longitudinal, less abrupt and shallow..6
6. Species somewhat robust, elytra shorter, sparsely punctured, strongly dehiscent.....**carinipennis**
   Delicate species, elytra long, moderately dehiscent and sharply pointed. **excavata**
7. Second segment of hind tarsus longer than third.....**cruentum**
   Second segment of hind tarsus equal to or shorter than third.....8
8. Second segment of hind tarsus subequal to third, slightly thicker, and flat above; vertex much elevated; front surface convex, body entirely black, elytra yellow with tips black or brown.....**dimidiatum**
   Second segment of hind tarsus shorter and thicker than third.....9
9. Vertex rounded, front surface convex, occiput without distinct suture (Pl. III, fig. 17).....**pectinatum**
   Vertex truncate, front surface flat or slightly concave, occiput with distinct suture.....10
10. Distal end of first and second segments of hind tarsus produced (Pl. III, fig. 18); pronotum red, elytra yellow.....**sayi**
    Distal end of segments of hind tarsus not produced, pronotum and elytra of the same color (Pl. III, fig. 16).....**octomaculatum**
11. Elytra short, not extending beyond end of abdomen.....**discicollis**
    Elytra long; extending much beyond end of abdomen.....12
12. Second segment of hind tarsus longer than half the length of the third, not flat above; male antennae longer than the pronotum.....**lineare**
    Second segment of hind tarsus about half the length of the third, flat and shining above; male antennae shorter than the pronotum.....**limbatum**

Macrosiagon flavipenne (Leconte)

1866. *Rhipiphorus flavipennis* Leconte, New Sp. North Am. Col., Smiths. Misc. Col., 6, p. 153.
1866. *Rhipiphorus abdominale* Leconte, Smiths. Misc. Coll., 6, p. 154.
1875. *Rhipiphorus flavipennis* Horn, Trans. Am. Ent. Soc., v, p. 121.
1891. *Emenadia flavipenne* Champion, Biol. Cent.-Am. Col., iv, pt. 2, p. 354.
1907. *Emenadia flavipenne* Cockerell, Trans. Am. Ent. Soc., xxxi, p. 211.
1915. *Macrosiagon flavipenne* Barber, Proc. Ent. Soc. Wash., xvii, p. 187.

Robust species, opaque black. Antennae yellowish brown in male, brown in female; the first two segments pale. Abdomen black in male, red in female with the last abdominal segments and posterior margin of the other tergites black or brown. Elytra entirely yellow in the male; yellow in the female, with a narrow strip at base and apical half black; the line of demarcation between the yellow and black surfaces usually semicircular. Wings yellowish brown.

Head elongate, vertex much elevated, the upper carina rounded, sometimes truncate or slightly emarginate; front surface concave and coarsely punctured, clypeus narrow and acutely rounded; mandibles long and very little curved, labrum elongate and pubescent. Antennae flabellate in the male, pectinate or deeply serrate in the female. Pronotum coarsely punctured, with two slight impressions on disc near front, posterior lobe with distinct broad process projecting posteriorly; apex of process truncate or feebly emarginate. Elytra punctured, slightly impressed, strongly dehiscent and acute. Second segment of hind tarsus not flat above as long as third.

Length, 7 to 11 mm.

Holotype.—Male, New York.[5] [Leconte Collection.]

Allotype.—Female. [Leconte Collection.]

Distribution.—Leconte described the species from three males taken in Missouri and New York. In the Leconte Collection there are some females which he apparently acquired later, and one of these, the one placed nearest to the holotype, may be considered as the allotype. Horn records the species from Pennsylvania, Illinois, Georgia and California; Fall and Cockerell record it from New Mexico, while Champion records it from Villa Lerdo in Durango, Mexico. The specimens examined were from the following localities:

Massachusetts, New York, New Jersey, Virginia, Michigan, Florida, North Carolina, Georgia, Louisiana, Alabama, Texas, California and Kansas.

This species is widely distributed and accordingly varies much in form, size, etc. This fact led Leconte to describe *M. abdominale* which, according to the original description (I have not seen any specimen in the Leconte Collection bearing the label *abdominale*) is conspecific with *flavipenne*.

Biology.—Two hosts are recorded for this species, as follows: *Prosopis glandulosa*, Rincon, New Mexico (Cockerell), recorded by Fall and Cockerell, 1907, p. 211. *Bembex spinolae*, Brookland, District of Columbia, June 26, 1914 (J. B. Parker), recorded by H. S. Barber, 1915, p. 187.

Macrosiagon fernaldum new species

The specimens in Mr. Frost's collection bear the label "*flavipenne* Lec." Those in Mr. Notman's collection are also confused with those of *flavipenne*. Dr. Horn, in his monograph on the

[5] In the Leconte Collection the specimen at the extreme left, which is considered the type, has no locality label. This specimen is no doubt from New York, since the other males bear the label "Mo."

genus, mentions a variety of *flavipenne* from California in which the abdomen of the male is red. Dr. Horn referred, no doubt, to the male of this species. *M. fernaldum* is very closely allied to *M. flavipenne*, and the male especially is very similar to the male of *M. flavipenne*. The difference between them, however, is quite distinct, and the following are the most outstanding features by which the two may be separated.

The female of *M. fernaldum* has the processes of the antennae bifurcate, the elytra yellow with a brownish tinge at apex, the wings hyaline, while in *flavipenne* the antennal processes are acute or truncate, elytra yellow with posterior half black and the wings are brown. The male of *M. fernaldum* has the abdomen red or brown red, wings hyaline, while *M. flavipenne* has a black abdomen and wings smoky at least near costal margin.

Robust. Head dark brownish or black; lacinia yellow; antennae of male orange yellow, of female brown; pronotum brown or dark brown with margins often red. Elytra yellow with narrow strip near base brown; the tips of elytra in the female with brownish tinge. Wings yellow-hyaline; abdomen in both sexes red; in the males sometimes dark red or brown.

Head elongate, vertex elevated into a rounded carina, with the front surface concave and roughly punctured. Clypeus narrowly rounded, punctate with its margins often red. Labrum elongate, tapering anteriorly, pubescent. Lacinia of maxillae filiform; mandibles but little curved, smooth with pubescent areas on sides near base. Antennae of male with rami comparatively short, process of female antennae biforcate.

Pronotum tapering anteriorly; disc sparsely, sides more closely punctate, two slight depressions on disc near anterior margin. Posterior lobe acute, with a distinct elevated process, and two depressions on each side. Elytra dehiscent, acute at tip, finely punctured; a narrow strip near base brown, tips of female elytra with brownish tinge. Tibial spines truncate, smooth at tip. Second segment of hind tarsus equal to third and not flat and smooth above.

Length, 7 to 11 mm.

Type.—Male: Lindsay, California, Aug. 4, 1911, (J. C. Faure). [U. S. National Museum, No. 41867.]

Allotype:—Female; Lindsay, California, July 29, 1909 (W. A. Davidson). [U. S. National Museum.]

Distribution.—The above description was made from four males and nine females from Lindsay, California, in the U. S. National Museum; from one female and two males collected in Palm Spring, California in the Frost Collection; from three females

bearing the label "Cal.", in Notman Collection, and from one male in the Horn Collection. The above specimens are labeled paratypes. Together with additional records the distribution is thus:

California: Lindsay, July (W. A. Davidson) (J. E. M. Gautt); Aug. (J. C. Faure), [U. S. N. M.]. Palm Spring, (Dr. Fenyes), [Mason Coll.; Frost Coll.]. Jewetta, Sept., (Rehn and Hebard), [Mason Coll.]. "Cal.", [Horn Coll.; Notman Coll.].

Specimens of this species have been taken on *Asclepias*.

I call this species *fernaldum* in honor of Dr. H. T. Fernald, my first teacher in Entomology and much respected friend and guide.

Macrosiagon bifoveatum (Horn)

1875. *Rhipiphorus bifoveatus* Horn, Trans. Am. Ent. Soc., v, pp. 121, and 123.
1891. *Emenadia bifoveata* Champion, Biol. Cent.-Am. Col., iv, Pt. 2. p. 354, t. 16.

The species is quite distinguishable by its excavation of pronotum; it differs from *M. excavatum* and *M. carinipenne* in having the same more abrupt.

Robust. Color black or dark brown. Antennae of male orange yellow with the tips of rami slightly fuscuous, antennae of female dark brown; elytra of male brownish, gradually becoming darker at base, often a small arcuate space at base of elytra yellowish; posterior margins of hind coxae and metaepimeron pale. Wings of male yellowish, those of female brown.

Head broad, vertex rounded sparsely but distinctly punctate, frons and clypeus more densely punctate, the margin of the latter broadly rounded. Mandibles reddish at base, smooth, with a pubescent area on side of mandibles near base. Labrum pubescent. Rami of antennae moderately long; in the female the processes increase in length toward the apex. Pronotum heavily punctured, disc elevated with two triangular excavations on each side near base, posterior lobe triangular its posterior angles not prominent. Elytra acute, strongly dehiscent, punctured, with smooth curved groove along sutural margin. Under side of body sparsely punctured, second segment of hind tarsus slightly shorter than third, flat and glabrous above.

Length, 8 to 14 mm.

Type.—Male; Illinois.[6] [Horn Collection, A. N. S. P., No. 8122.]

Alloplesiotype.—Female; Guatemala, (Sallé). [Horn Collection.]

[6] This species is more common in Central America and Mexico. The locality of the type is the only record north of Texas, and it is rather strange to note that no specimens have been taken in any place between Illinois and Texas.

Distribution.—Horn describes the species from a male taken in Illinois. Champion records the species from Mexico and Nicaragua. Specimens examined were from:

ILLINOIS: Type, [Horn Colln.].
GUATEMALA: (Salle), [Horn Colln.] [Bowditch Colln.; labeled Homotype.] [Edwards Colln.] (P. Sprague), [U. S. N. M.]
MEXICO: Oxaco, (Hoege), [M. C. Z.]
TEXAS: (G. D. Smith), [M. C. Z.]

Variation.—The Holotype and one male from Guatemala have the thorax black, while the other males of Guatemala have it brown or dark brown. One of the males has a transverse impression on the disc of pronotum in front of the two excavations.

Macrosiagon excavatum (Champion)

1891. *Emenadia excavata* Champion, Biol. Cent.-Am., Col., IV. pt. 2, p. 354.

Champion makes the following remark on this species and its difference from *M. bifoveatum* Horn:

"Though very variable as regards the colour of the head, thorax, under surface, and legs, *E. excavata* is unusually constant in the colour and markings of the elytra, these latter only varying in the predominance of the yellow or of the black, the markings being always distinct. *E. excavata* is nearest allied to *E. bifoveata* (Horn), from which it differs, apart from the colour and markings of the elytra, by the shallower, longer, and much less abrupt depression on either side of the disc of the thorax behind; also by its narrower general shape, and less dehiscent and less acuminate elytra."

Color ferruginous or black. Head red or black, antennae of male testaceous or reddish with the rami blackish; in the female black with the two basal joints reddish testaceous. Pronotum ferruginous. Elytra yellowish, with base, margins and longitudinal line extending from apex to a short distance behind base, dark fuscus or deep red. Thorax beneath and abdomen black or ferruginous. Posterior margin of metepimeron and hind coxa yellowish.

Vertex rounded convex, very finely and sparsely punctate; clypeus narrowly truncate or slightly notched at apex. The process in the female antennae increases in size toward apex. Pronotum gradually narrowing toward front, finely punctured, disc slightly raised and with two longitudinal excavations on each side near base. Posterior lobe acute, not much elevated, hind angles acute but not projecting backward. Elytra long, sharply pointed, becoming gradually dehiscent a little behind the base; with a longitudinal channel from base to apex and a more or less

elevated ridge near the channel. The channel is more excavated about a fifth the distance from apex. Thorax beneath sparsely punctate and shining. Second segment of hind tarsus shorter than third and broad and flat above.

Length, 4.5 to 9 mm.

Type.—Male; Oxaca, (Hoege). Mexico. [British Museum.]

Allotype.—Female; Oxaca, (Hoege), Mexico. [British Museum.]

Distribution.—Champion described this species from forty-one specimens, all taken in Mexico.

Four of the specimens I have examined were sent from the British Museum to various institutions in this country. They all bear the label, Oxaca Mexico (Hoege)[7] and are distributed as follows: Two females in Museum of Comparative Zoology, one female in the American Museum of Natural History, one female in the U. S. National Museum. Two other females in the Bowditch Collection bear the label "Mex."

Macrosiagon carinipenne (Champion)

1891. *Emenadia carinipennis* Champion, Biol. Cent.-Am., Col., IV, Pt. 2, p. 355.

According to Champion the species differs from *M. excavatum* as follows:

"Broader and less elongate; the elytra much more sparsely punctured, more dehiscent posteriorly, less sharply pointed at the tip, and with a well-defined sublateral carina, the base only black; the longitudinal groove on either side of the disc of the thorax behind shallower, the intermediate space much less convex; the vertex a little flattened in front; the antennae, the extreme tips of the rami excepted, brownish-yellow; the legs reddish-testaceous, with the femora piceous."

"Length 8½ mm."

Monotype.—Male; Yantipec in Morelos, (Hoege). [British Museum.]

Macrosiagon dimidiatum (Fabricius)

1781. *Mordella dimidiata* Fabricius, Spec. Ins., I, p. 332.
1792. *Rhipiphorus dimidiatus* Fabricius, Entom. System., p. 112.
1795. *Rhipiphorus dimidiatus* Olivier, Ent. Col., III, 65, p. 8.
1801. *Rhipiphorus dimidiatus* Fabricius, Syst. Eleuth., II, p. 120.
1855. *Rhipiphorus dimidiatus* Gerstäcker, Rhipiph., Col. Fam., p. 21.
1866. *Rhipiphorus marginale* Leconte, New Spec. N. Am. Col., p. 154.
1875. *Rhipiphorus dimidiatus* Horn, Trans. Am. Ent. Soc., V, pp. 121, 122.

This species is in many collections confused with those of *M. flavipenne*, *M. pectinatum*, and in one case a small specimen was

[7] The specimen from the Museum of Comparative Zoology bears the label "Cotype."

found with those of *M. cruentum.*[8] It may be separated from *pectinatum* and *cruentum* by the hind tarsal segments. In *cruentum* the second tarsal segment is longer than the third, in *dimidiatum* they are subequal, while in *pectinatum* the second is shorter than the third. Although Dr. Horn, in his description of this species, states that the second segment is shorter than the third, the term "subequal" will better describe it. I have measured the segments and found the difference is hardly noticeable. The third segment, being more slender, appears longer than the second. In its general appearance *M. flavipenne* is very much like *M. dimidiatum;* on closer examination, however, the following differences are clearly noticeable: the abdomen of the female of *flavipenne* is red, while it is black in *dimidiatum;* the elytra of the male flavipenne are entirely yellow, while their tip is black in *dimidiatum.* The vertex of *flavipenne* is concave in front and the pronotum has a distinct process, while the frons of *dimidiatum* is flat or convex, and there is no distinct process on the pronotum.

Black, elytra yellow with a narrow strip along the base; and the tips, black or brown. Head elongate, vertex elevated, rounded above, its front surface convex or flat, sparsely punctate; clypeus broad, obtusely angulate, rounded at apex and sometimes slightly emarginate on sides of angle. Labrum elongate, with its apex rounded, hairy; lacinia of maxillae longer than palpi, and filiform. Mandibles slightly curved, acute, smooth with punctured area on sides near base. Male antennae yellow luteous. Female antennae pectinate, processes acute, first and second segments reddish, otherwise brownish-black. Pronotum punctured, posterior lobe slightly convex with a cup-shaped depression near apex or with the same truncate. Elytra flat, punctured, rapidly narrowing toward the apex, tips very acute; in the male a small area at tip is black, while in the female, about the entire posterior half is black, and the line of division between the black and the yellow is oblique. Second segment of hind tarsus subequal to third, and both are flat above. Abdomen and thorax opaque and finely punctured in both sexes.

Length, 5 to 11 mm.

Distribution.—The species was described by Fabricius from North America (Mus. D. Yeats). Horn records the species from

[8] This confusion with *M. cruentum* in Mr. Leng's collection caused an error in the List of Insects of New York, edited by Dr. Leonard. *M. cruentum* is a Southern species and of all the specimens examined, I found none from New York, and although Blatchley records it from Indiana, I doubt whether it would be found in New York. The specimen with the record of Peekskill in Mr. Leng's collection, upon examination, was found to be a *M. dimidiatum.*

New York, Florida and Missouri. The specimens which have been examined were from the following localities:

New Hampshire, New York, New Jersey, North Carolina, Virginia, Florida, Missouri, Texas, Arizona, Arkansas, Kansas, and California.

Macrosiagon acutipenne (Pierce)

1904. *Rhipiphorus acutipenne* Pierce, Stud. Univ. Nebr., IV, p. 163.

The holotype and paratypes (U. S. N. M. No. 8255) were examined, but I could not find any characters by which it may be distinctly separated from *M. dimidiatum*, Fab.

Macrosiagon octomaculatum octomaculatum (Gerstäcker)

1855. *Rhipiphorus octomaculatus* Gerstäcker, Rhipiph. Col. Fam., p. 22.
1858. *Rhipiphorus puncticeps* Leconte, Jour. Acad. Nat. Sci. Phila. (2), IV, p. 20.
1875. *Rhipiphorus octomaculatus* Horn, Trans. Am. Ent. Soc., V, pp. 122, 123.
1891. *Emenadia octomaculata* Champion, Biol. Cent.-Am., Col., IV, pt. 2, p. 356.

Robust. Head entirely black or red, or partly red and black. Antennae blackish, pronotum red with two black oblong spots which are often obsolete; elytra with three spots, humeral, middle and apical. Thorax beneath, varying from red to black; legs varying from reddish to black. Wings pale brown. Abdomen always red.

Head short and coarsely sculptured. Vertex very broadly truncate, occiput densely pubescent, with distinct occipital suture which extends to the tip of vertex. Distinct humeri present above each eye; frons punctate with a smooth median line, punctation very close near the eyes and sides of clypeus, the latter broadly truncate, slightly emarginate or bilobed. Labrum short, emarginate or bilobed, setiferous. Mandibles curved, smooth; punctured only on sides near base. Antennae situated under small tubercles near middle of eyes; in both sexes shorter than head. Processes of female antennae bifurcate; in the male the rami are comparatively short. Pronotum coarsely punctured, pubescent, short, broad and very much bent; posterior lobe short, and sometimes truncate; elytra short, gradually tapering, coarsely punctured. Thorax beneath very finely and closely punctate, covered with dense golden pubescence. Second segment of hind tarsus slightly shorter than third and rather broad and flat above.

Length, 5 to 12 mm.

Distribution.—Gerstäcker described the species from Illinois and Brazil. ["Zool. Mus. Berlin u. Greifswald"], Horn records the species from Florida, Georgia, Kansas and Texas. Specimens examined were from the following localities:

North Carolina: Wilmington, August, (G. P. Engelhardt), [Schaeffer Colln.].
Florida: Jacksonville, [Leng Colln.].

GEORGIA: Jekyll Island, September, (Bromley) [A. M. N. H.].
ALABAMA: Mobile (Loding).
TEXAS: [Leng Colln.].
ARIZONA: Huachuca Mountains, August, [Notman Colln.; Schaeffer Colln.; A. M. N. H.; Charles Palm Colln.; Leng Colln.] Phoenix, [Leng Colln.].

Variation.—*M. puncticeps* Leconte, which has been considered by Horn as a variety of *octomaculatum*, is practically identical with this. The type in the Leconte Collection has no distinct black spots on the thorax, but this characteristic is not of value since there are many intermediate stages between the two extreme forms. As to other characteristics, Leconte's type is practically identical with the specimens compared. Most of the specimens before me have reddish legs but some have them dark red, while still others have black legs; the color of the legs therefore is not of great varietal value.

Macrosiagon octomaculatum maritimum new variety

Very robust. Head and thorax like in the preceding. Elytra shorter, with distinct humeral spot, and the two others confluent with each other. In some specimens the humeral spot is also confluent with the median, while in still other specimens the apical is connected with the middle only by a narrow strip along the suture. Legs reddish or black. The male is similar to that in the preceding variety except that the middle spot on elytra is more conspicuous.
Length, 6 to 14 mm.

Type.—Female; Springhill, Alabama, November. [American Museum of Natural History.]

Paratypes.—All females; Gulfport, Florida, (Reynold), [Leng Colln.]. Springhill, Alabama, [Schaeffer Colln.]. Florida, [U. S. N. M., 1, no. 41868].

Distribution.—In addition to the above, material has also been examined from Mobile, Alabama, June, (Loding), [Frost Colln.], and Jacksonville, Florida, [M. C. Z.].

Variation.—The variation in size in the different specimens of this variety is extreme. One specimen from Mobile is 6 mm. while others are 14 mm. long and very robust. As in the preceding variety, the pronotum may be without distinct spots.

This variety is mostly confined to the gulf states and apparently thrives best along the coast.

Macrosiagon sayi (Leconte)

1823. *Rhipiphorus bicolor* Say, Jour. Acad. Phila., III, p. 275, (Complete Writing II, 1859, p. 162.) Preocc.

1858. *Rhipiphorus sayi* Leconte, Jour. Acad. Nat. Sci. Phila., IV, p. 21.

1875. *Rhipiphorus octomaculatus sayi* Horn, Trans. Am. Ent. Soc., V, p. 123.

Horn considered this species as a variety of *octomaculatum* Gerstäcker; but for the reasons indicated below, it should be considered as a distinct species. The sexes are distinctly different in color, while in *octomaculatum* that is not the case. The legs in this species are concolorous and do not vary in color as is the case in the varieties of *octomaculatum*. The form of the apex of the tarsal segment differs entirely from that in *octomaculatum* and in general structure it is more delicate.

Head black in the males, red in females; antennae fuscous, first and second segment red. Pronotum red in both sexes; elytra of male testaceous, with base and tip black; sometimes an indistinct spot is present in the middle. Female antennae with three brownish black spots usually confluent with each other to form a curved line extending from base to apex. Thorax beneath, black in the males and dark brown in the females. Abdomen in the males black, in the females red. Legs in both sexes dark brown.

Vertex broadly truncate, occiput pubescent, with occipital suture present, this is sometimes indistinct, front surface sparsely punctate with median smooth line, clypeus more closely punctate. Pronotum punctured, posterior lobe acute, with a smooth elevated median line extending from its apex anteriorly. This is sometimes obsolete. Thorax beneath very densely punctured and pubescent. Hind tarsus with second segment shorter than third. The apices of the tarsi, especially of the second segment, are produced on both sides into lobe-like projections (see Pl. III, fig. 18).

Length 7 to 11 mm.

Distribution.—New Jersey, Pennsylvania, Delaware, District of Columbia, Virginia, North Carolina, Florida, Louisiana, Kansas, Missouri, Illinois, Arizona and California.

Say described this species as *bicolor* from Pennsylvania, and Leconte renamed it since that specific name has been used before by Castelnau.

The species is comparatively common, and is distributed throughout the Southern States from coast to coast. It is found from May to August.

Host.—Elis sp. One specimen of *M. sayi* Lec. with the cocoon from which it emerged, was sent to the U, S. National Museum from the Japanese Beetle Laboratory. Upon inquiry, Mr. Loren B. Smith, Senior Entomologist in Charge of that Laboratory, in a letter dated May 9, 1928, writes the following:

. . . I find by referring to our records that the Rhipiphorid beetle *Marcosiagon sayi* Lec. was reared from a cocoon of *Elis* which was collected at Centralia, Ill., April 20, 1921. Two species were found in that locality, namely *E. obscura* Say. and *E. quinquicincta* Fabr. It is not known from which one of these species the beetle was reared, although I presume it was *obscura*, since there were more of these in the collection. The rearing was done by Dr. T. H. Frison.

Macrosiagon cruentum cruentum (Germar)

1824. *Rhipiphorus cruentus* Germar, Ins. Spec., Nov., I, p. 168.
1855. *Rhipiphorus cruentus* Gerstäcker, Rhipiph. Col. Fam., p. 27.
1875. *Rhipiphorus cruentus* Horn, Trans. Am. Ent. Soc., V, p. 122 and 124.
1891. *Emenadia cruenta* Champion, Biol. Cent.-Am. Col., IV, Pt. 2, p. 357.

This species is sometimes confused with *dimidiatum* or *pectinatum* but it is easily distinguished from these as it is the only species which has the second tarsal segment longer than the third. The amount of red and black is variable. One species from Texas has the elytra entirely red. The abdomen of the male is usually black but sometimes red. The abdomen of the female is usually red but sometimes black. Some specimens have the abdomen partly red and black.

Head and thorax black, abdomen red or black, elytra red, with base and tip black. Wings brownish. Head oval, black, vertex broadly rounded, its front surface flat or very slightly concave, sparsely punctured and shining; frons and clypeus more densely punctured, the latter broadly truncate, or very slightly emarginate. Mandibles red at base, black at tip. First and second segments of antennae rufous, otherwise fuscous, processes acute at tip. Pronotum broad, slightly tapering roward front, punctured; posterior lobe convex with two slight concavities on each side. Sides of elytra straight, sutural margin curved sideward to form rounded tips. Pleural region of thorax punctured; second segment of hind tarsus longer than third and slender.

Length, 5 to 8 mm.

Distribution.—This species was described by Germar[9] from North American specimens. Gerstäcker records it from Mexico. Horn states it is distributed from Georgia to California. Champion records it from Guanajuato, Mexico; specimens examined were from the following localities:

Virginia, North Carolina, Florida, Louisiana, Arkansas, Texas, Arizona, Utah and California.

Two other distinct varieties are distinguished in this species as follows:

[9] According to W. Horn the Germar Collection of Coleoptera is partly in the Zoological Museum of Berlin, and in Deutsche Entomologische Institut (Mus.) Berlin-Dahlem.

Macrosiagon cruentum rufum (Leconte)

1854. *Rhipiphorus rufus* Leconte, Proc. Acad. Nat. Sci. Phil., v, p. 225.
1875. *Rhipiphorus cruentus rufus* Horn, Trans. Am. Ent. Soc., v, p. 125.

Head, pronotum and abdomen yellow, elytra yellow, tip often blackish.
Length, 5 to 7 mm.

Type.—Female; San Diego, California. [Leconte Collection.]

Plesiotype.—Male; Isabella, California, June. [Frost Collection.]

Distribution.—Other specimens examined were as follows:

California: Isabella, June, [Frost Colln.], Tulare Co. and Pasadena, [Schaeffer Colln.].

This species is limited apparently to California but may be found in neighboring localities.

Macrosiagon cruentum horni new variety

1875. *Rhipiphorus cruentus* var. Horn, Trans. Am. Ent. Soc., v, p. 125.

Horn described this variety, but did not call it by name. I think, however, because of the characteristics stated that it deserves a varietal name, which I give it in honor of its first describer, Dr. George H. Horn.

Head black, the pronotum rufo-testaceous, elytra with tip and base very narrowly black, male abdomen black, female abdomen red.
Length, 5 to 7 mm.

Type.—Female; Texas. [Horn Collection, A. N. S. P., No. 8136.]

Distribution.—Specimens of this variety have also been examined from: Dummit County, Texas, [Leng Colln.], and San Diego, California, [Hubbard-Schwarz Colln.].

Macrosiagon limbatum (Fabricius)

1781. *Mordella limbata* Fabricius, Spec. Ins., I, p. 332.
1792. *Rhipiphorus limbatus* Fabricius, Entom. System., II, p. 112.
1795. *Rhipiphorus limbatus* Olivier, Entom. Col., III, 65, p. 6.
1801. *Rhipiphorus limbatus* Fabricius, Systema Eleuth., II, p. 121.
1835. *Rhipiphorus limbatus* Say, Bost. Jour. Nat. Hist., I, p. 189.
1855. *Rhipiphorus limbatus* Gerstäcker, Rhipiph. Col. Fam., p. 30.
1859. *Rhipiphorus limbatus* Say, Complete Writings (Ed. Leconte), II, p. 660.
1875. *Rhipiphorus limbatus* Horn, Trans. Am. Ent., Soc., V, pp. 122, 125.
1891. *Emenadia limbata* Champion, Biol. Cent.-Am. Col., IV, pt. 2, p. 358.

Head yellow, vertex often black; clypeus often reddish; mandibles black, base yellow, antennae blackish, first and second segments yellow; pronotum yellow with discal black spot varying in size. Elytra usually black, sometimes pale,

with sides, suture and base narrowly black. Wings brown. Thorax yellow beneath, often variegated with black. Femora yellow with apex black; anterior tibia black, others yellow with apical half black, or often entirely black; tarsi black or annulated with yellow.

Head elongate, vertex rounded, glabrous; frons smooth, clypeus slightly punctured, apex broadly truncate or emarginate; labrum elongate, its apex rounded, lacinia long filiform, hairy; mandibles moderately curved. Pronotum elongate, slightly tapering forward, sparsely punctured, posterior lobe large and acute, hind angles prolonged and slightly covering the elytra. Elytra sparsely punctured, long, slightly tapering toward the end. Thorax sparsely punctured. Pleural sclerites very little convex, not bulging beyond lateral margin of pronotum; front coxae separated by prosternal spine, legs slender and long. Second segment of hind tarsus about half the length of the third segment, flat and shining above.

Length, 5 to 12 mm.

Distribution.—The native country of this species was not known to Fabricius. He described it, however, from a specimen taken from the same collection (Mus. D. Yeats) as M. dimidiatum—and the locality for the latter was given as North America.

Horn states the species is found from Pennsylvania to Texas. Champion records it from Mexico, Guatemala, Costa Rica and Panama. The specimens examined were from the following localities:

New Hampshire, Massachusetts, Connecticut, New York, New Jersey, Delaware, Pennsylvania, District of Columbia, Maryland, North Carolina, Virginia, West Virginia, Florida, Georgia, Texas, Arizona, Kansas, Arkansas and Iowa.

From the list of localities we see that the species is most common along the Atlantic coast although specimens have been taken as far west as Arkansas. The northern record of its distribution is New Hampshire and the southern is Panama.

The species is most common in July and August, and has been taken by sweeping, and upon the following plants: goat weed, Elder, *Solidago*, *Eupatorium*, *Spirae* and upon the Mint plants namely: *Pycnanthemum flexuosum*, *Monarda punctate* and *Monarda citriodora*.

Variation.—The species is comparatively common and widely distributed. Accordingly, the variations in the specimens are numerous. Say divided this species into three varieties, namely: variety a, with vertex black; variety b, elytra black, immaculate; and variety c, beneath, variegated with black. These varieties are not valid, since the amount of black on the individuals is extremely variable, and the varieties merge into one another.

Macrosiagon limbatum pulchrum new variety

Head, thorax and abdomen entirely reddish yellow; without any black spots. Elytra black. Body very shining. Elytra less dehiscent.

Length, 9 mm.

Type and Paratype.—Females; Black Mountains, North Carolina, (W. Beutenmuller, June). [Frank R. Mason Collection at the Academy of Natural Sciences of Philadelphia, no. 8137.]

Two females of this beautiful variety were taken by Mr. W. Beutenmuller.

Macrosiagon lineare Leconte

1866. *Rhipiphorus lineare* Leconte, New Spec. North Amer. Col., Smiths Misc. Coll., 6 p. 154

1875. *Rhipiphorus lineare* Horn, Trans. Am. Ent. Soc., v, p. 122, 125.

Specimens of *M. lineare* are often confused with those of limbatum Fabricius. The characteristics given in the key, however, and their short face and smaller size, should readily separate it from *limbatus*.

Head yellow-ferruginous, brown or black. Antennae fuscous, first and second segment reddish. Pronotum ferruginous, brown or black, elytra black, sometimes with a brownish tinge. Wings brownish. Thoracic sclerites brown, yellow or variegated; femora brown, tibia and tarsi variably variegated. Abdomen ferruginous or black, pygidium dark.

Narrow, subparallel. Head short, shining; vertex broadly rounded, smooth, frons shining, clypeus very slightly punctured, its front margin broadly rounded, labrum broad; mandibles entirely, or only at tip, black. Pronotum tapering very slightly toward apex, sparsely punctured; posterior lobe broad, slightly convex; hind angles of pronotum produced and acute. Elytra slightly depressed along the disc, gradually tapering and dehiscent only at the end. Thoracic sclerites sparsely punctured. Mesoepimeron and episternum of mesothorax flat, and not bulging beyond lateral margins of pronotum; anterior coxae separated by a prosternal spine; tibiae and tarsi variably variegated. Second segment of hind tarsi longer than one-half of the third, not flat nor shining above. Abdomen sparsely punctured.

Length, 4 to 6 mm.

Type.—Male; Kentucky. [Leconte Collection.]

Leconte described the species from one male specimen taken in Kentucky. One male and female now in the Charles Palm Collection, American Museum of Natural History, were collected in Southwest Arkansas. This male (Homotype) was compared with the type in the collection of Leconte, and is identical with it in all

respects except size and color. The type specimen is entirely dark and much smaller than the Arkansas Specimen, while the latter has thorax and abdomen red. The female (Plesiotype) from the same locality has been compared with the type and is identical with it, except in size and color and secondary sexual characteristics, its antennae being pectinate.

Other specimens examined were from Arizona, Huachuca Mountain, July, in the collections of Messrs. Notman, Leng and Schaeffer and from Alabama in the Collection of H. P. Loding.

Macrosiagon discicollis (Gerstäcker)

1855. *Rhipiphorus discicollis* Gerstäcker, Rhipiph. Col. Fam., p. 32.
1855. *Rhipiphorus mutilatus*, Gerstäcker, Rhipiph. Col. Fam., p. 32.
1855. *Rhipiphorus 4-maculatus*, Gerstäcker, Rhipiph. Col. Fam., p. 33.
1877. *Emenadia melanoptera*, Chevrolat, Bull. Soc. Ent. France, p. IX.
1889. *Emenadia vitraci*, Fleutiaux and Salle, Ann. Soc. Ent. France, IX, p. 432.
1891. *Emenadia discicollis* Champion, Biol. Cent.-Am., Col., IV, pt. 2, p. 358.

"Oblong, ovate rufo-ferruginous, head, antennae except base and legs, black; pronotum and elytra bluish black. Head suborbicular, smooth black, shining; its vertex little elevated, rounded above. Mandibles rufopiceous, palpi yellow; antennae black except its three basal segments yellow; thorax subtriangular, little longer than wide, strongly attenuated toward front, lateral sides inflexed, posterior angles acute; behind, obtusely triangular toward scutellar lobe, above convex, slightly punctate, glabrous, shining rufo-ferruginous, discoidal spots blue-black. Elytra little narrower than base of pronotum, more than half as long as base of thorax, sides whitened a little towards the middle, not attenuated toward the rear, with the apex subtruncate, internal angle rounded. Above, moderately convex with moderately thick and fine punctation; body below with blue markings, red, punctate, somewhat shining. Legs black, spines and claws ferruginous."

Length, 6 to 5 mm.

The above is a translation from the original description by Gerstäcker.

Distribution.—Gerstäcker described this species from Brazil, [Type in Zool. Mus. Berlin-Greifswald], while Champion records it from Mexico, Columbia, Antilles, Cuba, Porto Rico and Guadaloupe, (Plesiotypes), [British Museum].

Variation.—Upon the specimens taken from Central America, Champion states as follows: "We have received four female specimens of an *Emenadia* from Mexico agreeing very well with Gerstäcker's description of *E. discicollis*, and there is also a Mexican example of the same species in the British Museum. In three

of these the elytra are black with a slight bluish ting in certain lights, and the thorax is rufous or reddish-testaceous with the disc to a variable extent black; one (from Sturm's collection) is reddish-testaceous above and beneath, with the apices of the elytra black; one (in the British Museum) is reddish-testaceous, with the base of the elytra very broadly and also a large apical patch black."

Macrosiagon pectinatum (Fabricius)

1775. *Mordella pectinata* Fabricius, Systema Entom., p. 263.
1775. *Mordella sexmaculata* Fabricius, Systema Entom., p. 263.
1792. *Rhipiphorus pectinatus* Fabricius, Entom. System., p. 111.
1792. *Rhipiphorus sexmaculatus* Fabricius, Entom. System., p. 111.
1795. *Rhipiphorus secmaculatus* Olivier, Entom. Col., III, 65, p. 6.
1801. *Rhipiphorus pectinatus* Fabricius, Systema Eleuth., II, p. 119.
1801. *Rhipiphorus sexmaculatus* Fabricius, Systema Eleuth., p. 111.
1846. *Rhipiphorus dubium* Melsheimer, Proc. Acad. Nat. Sci. Phila., II, p. 316.
1846. *Rhipiphorus fasciatus* Melsheimer, Proc. Acad. Nat. Sci. Phila., II, p. 317.
1846. *Rhipiphorus ambiguus* Melsheimer, Proc. Acad. Nat. Sci. Phila., p. 317.
1846. *Rhipiphorus nigrus* Melsheimer, Proc. Acad. Nat. Sci. Phila., II, p. 317.
1855. *Rhipiphorus pectinatus* Gerstäcker, Rhipiph. Col. Fam., p. 30.
1875. *Rhipiphorus pectinatus* Horn, Trans. Am. Ent. Soc., V, p. 121.
1891. *Emenadia pectinata* Champion, Biol. Cent.-Am., Col., IV, pt. 2, p.

Probable varieties

1801. *Rhipiphorus humeratus* Fabricius, Systema Eleuth., II, 119.
1801. *Rhipiphorus nigricorne* Fabricius, Systema Eleuth., II, p. 119.
1801. *Rhipiphorus triste* Fabricius, Systema Eleuth., II, p. 120.
1801. *Rhipiphorus ventrale* Fabricius, Systema Eleuth., II, p. 120.
1824. *Rhipiphorus sanguineolentus* Germar, Ins. Spec. Nov. XXIV. p. 169.
1846. *Rhipiphorus impressus* Melsheimer, Proc. Acad. Nat. Sci. Phila., II, p. 316.
1846. *Rhipiphorus maxillosus* Melsheimer, Proc. Acad. Nat. Sci. Phila., II, p. 316.
1846. *Rhipiphorus longipes* Melsheimer, Proc. Acad. Nat. Sci. Phila., II, p. 317.
1846. *Rhipiphorus thoracicus* Melsheimer, Proc. Acad. Nat. Sci. Phila., II, p. 317.
1855. *Rhipiphorus varicolor* Gerstäcker, Rhipiph. Col. Fam., p. 25.

This species is extremely variable from red to black.[10] The general characteristics are stated in the key, and those by which to separate it from other species are stated in the discussion of the various species which are similar to it.

Distribution.—The species is distributed all over North and Central America.

[10] The author feels that a further study is necessary before a key to the various varieties and races of this species can be arranged.

RHIPIPHORUS Bosc.

1792. *Rhipiphorus* Bosc., Jour. Hist. Nat., II, p. 293.
1818. *Myodes* Latereille, Nouv Dic. d'Hist. Nat., ed. 2, XXV, p. 130.
1819. *Myodites* Latereille, Nouv. Dic. d'Hist. Nat., ed. 2, XXIX, p. 302 (not a).
1823. *Dorthesia* Say, Jour. Acad. Phil., III, p. 274.
1855. *Myodites* Gerstäcker, Rhipiph. Col. Fam., p. 15.
1859. *Myodites* Lacordaire, Hist. Ins. Col., V, p. 630.
1880. *Myodites* Leconte, Trans. Am. Ent. Soc., VIII, p. 210.
1892. *Myodites* Horn, Trans. Am. Ent. Soc., XIX, p. 48.
1891. *Rhipidophorus* Champion, Biol. Cent.-Am. Col., IV, p. 359.
1904. *Myodites* Pierce, Stud. Univ. Nebraska, IV, p. 157.
1920. *Myodites* Pierce, Ent. News, XXXI, p. 277.

Vertex elevated above anterior margin of pronotum. Eyes prominent, situated on sides of head, leaving a broad frons and clypeus. Mandibles prominent but bent inwardly. Antennae eleven segmented, often ten segmented in females, inserted above the eyes, one on each side of the vertex. Male antennae biflabellate, those of female monoflabellate, pectinate or deeply serrate, the first two segments without process. Pronotum broad, with no distinct lateral carina, pseudopleuron small and inconspicuous. Scutellum of mesonotum usually hidden under the posterior lobe of pronotum but may be seen when the insect is bent. Elytra very short, convex and scale-like; wings uncovered, and not folded, the metanotum and dorsal part of abdomen thus being left exposed. Metathorax well developed; seventh tergite of the abdomen in the female developed into a very conspicuous shield-like pygidium. The entire abdomen of the female is so bent that the pygidium is found on the ventral side of the body, and the ovipositor is directed obliquely forward. Legs short, first and last segment of hind tarsus usually larger than the others, third one smallest; claws in both sexes pectinate, but in the males the teeth on the claws are more numerous and finer. The length of the first segment of the hind tarsi varies with the species and serves as a good character for classification. The pygidium also differs in size and shape and serves for that purpose. Other characteristics used in classification are the shape of vertex, form of antennae, colors of abdomen, etc.

The genus may be separated into two main divisions. One group consists of those species in which the first segment of hind

tarsus is long, slightly thicker than the others and not at all obliquely truncate, while the other group consists of those species in which the first segment of hind tarsus is elevated, thicker than the others and obliquely truncate. There are, however, intermediate stages between the two, and we find species that cannot be classified distinctly in either.

In arranging the key for the species of this genus, we are confronted by another difficulty, namely, antigeny. In this genus the sexes differ from each other more than in the preceding genera, with the exception of Rhipidius. In some species the general color differs in both sexes, while in others the color is the same. The shape and proportional length of the tarsal segments, however, are similar in the two sexes and serve for identification of the same. Leconte and Pierce used the color characteristics of male and female together with structural differentiation in the same key, and this made it altogether very complicated. In order to avoid some difficulties, it was found most convenient to divide the genus into divisions based on the shape of the tarsal segments, and then into groups based on the color characteristics of the two sexes. In some cases the author placed the species of which one sex only is known, in the same group of its nearest allies. New discoveries may, therefore, cause some changes in the following classification.

Key to the Groups of Rhipiphorus

First segment of hind tarsus obliquely truncate and emarginate at tip; as a rule this segment is shorter than all others combined, and elevated.

1. Female abdomen black or brown, male abdomen of same color. *Group luteipennis*
2. Female antennae 10 segmented, deeply serrate, processes subequal; female abdomen yellow, that of the known males black..... *Group scaber*
3. Female antennae 11 segmented, rami very long in female, decreasing in length toward apex. Female shining; abdomen straw-yellow variegated with brown-black, male black..... *Group vierecki*
4. Female abdomen for greatest part reddish-yellow; male abdomen the same as female..... *Group popenoei*

First segment of hind tarsus not obliquely truncate, very little thicker than the others, and as long as all others combined.

Female abdomen partly yellow, partly brown; male abdomen (as far as known) like that of female..... *Group californicus*

Female abdomen entirely brown; male as that of female..... *Group fasciatus*

First segment of hind tarsus as long as all others but a little thicker, a little truncate and emarginate at apex.

Female abdomen orange-yellow, male unknown..... *Group aurantus*

Group luteipennis

1. First segment of hind tarsus much longer and thicker than second.....2
   First segment of hind tarsus only a trifle longer than second and very little thicker. Second segment much longer than third. Pl. IV, fig. 8t.. *minimus*
2. Female antennae eleven segmented, elytra yellow, base brown-black (male not known). Pl. IV, fig. 1a..... *calopterus*
   Female antennae ten segmented.....3
3. Pygidium longer than broad, (male not known). Pl. IV, fig. 2p..... *nevadicus*
   Pygidium as long as broad, concave and shining. Pl. IV, fig. 3p.. *luteipennis*

To this group probably belongs *Rhipiphorus brevipes*.

Rhipiphorus luteipennis (Leconte)[11]

1865. *Myodites luteipennis* Leconte, Proc. Acad. Nat. Sci. Phil., XVIII, p. 97.
1880. *Myodites luteipennis* Leconte, Trans. Am. Ent. Soc., VIII, p. 210.
1892. *Myodites luteipennis* Horn, Trans. Am. Ent. Soc., XIX, p. 48.
1904. *Myodites luteipennis* Pierce, Stud. Univ. Nebr., IV, p. 161.
1920. *Myodites luteipennis* Pierce, Ent. News, XXXI, p. 277.

The species may be separated from its allies by its smooth, concave and shining pygidium, antennal rami curved, and vertex broadly rounded and sparsely punctate.

Body black or brown, elytra dark amber yellow. Head large, vertex rounded, sparsely punctate, front wide and flat; slight concavity around vertex, clypeus slightly emarginate, antennae of male eleven segmented and of the same color as elytra, rami slightly curved and fuscous at tip. Antennae of female ten segmented pectinate, brown, first rami curved, and directed meso-anteriorly. The first five or six rami are subequal, the last few short. Pronotum sparsely punctate and pubescent along sides with two shining glabrous areas on both sides of disc. Base broadly rounded, truncate or slightly emarginate. Elytra shining fuscous, closely punctate at base, finely so along margins. Thorax beneath, and abdomen, sparsely pubescent, pygidium triangular, smoothly rounded at tip, punctate along dorsal margin, less so along sides and smooth and very shining on concave center. Front and second legs yellowish or brown yellow, hind legs brown. First segment of hind tarsus obliquely truncate and elevated but shorter than last one. Hind tibia distinctly longer than tarsus.

Length, 6 to 8 mm.

Type.—Female; New York. [Leconte Collection.]

[11] Csiki, in his catalogue, has erroneously placed this species in the genus *Macrosiagon* and consequently he renamed *M. luteipenne* M'Leay.

Distribution.—Leconte described this species from two females taken in New York. There is also a male in the Leconte Collection from Selma, Alabama. Other specimens examined were taken in:

MAINE: Wales, August (C. A. Frost). NEW JERSEY: Dunellen, Bear Swamp near Ramsey, September, [Schaeffer Colln.].

NEW YORK: Staten Island, August, (Leng), Mosholu, (Schaeffer); Richmond, August, (W. T. Davis); [A. M. N. H.].

Variation.—Two females, the one in the Schaeffer Collection from Mosholu, N. Y., and the one in the Frost Collection from Wales, Maine, are light brown, and the pygidium is more shining and concave than in the others; the one from Wales, however, was collected *in Coito* with a normal male, which does not differ from the other males; there is therefore no doubt that the two females are merely a light-colored form of *luteipennis*.

Rhipiphorus nevadicus Leconte.

1880. *Myodites nevadicus* Leconte, Trans. Am. Ent. Soc. VIII, p. 210.211.
1892. *Myodites nevadicus* Horn, Trans. Am. Ent. Soc., XIX, p. 48.
1904. *Myodites nevadicus* Pierce, Stud. Univ. Nebr., IV, p. 157.
1920. *Myodites nevadicus* Pierce, Ent. News., XXXI, p. 277.

The vertex of *Rh. nevadicus* is similar to the vertex of *luteipennis*, but the species may be easily separated by the form of the pygidium, which is elongate in *nevadicus* and broader and more concave in *luteipennis*.

Brown, shining, elytra amber yellow. Head wider than long, vertex broadly rounded and sparsely but distinctly punctate, front flat or very slightly concave, sparsely pubescent. Antennae curved, 10 segmented, pectinate, rami subequal except last two that are shorter. Pronotum rounded at base, punctate and slightly pubescent along base, sides and center of disc, the anterior part is smooth and glabrous. Elytra sparsely and very finely punctate. Wings hyaline with anterior margin and band brownish. Abdomen more densely pubescent, margins of segments slightly darker, pgyidium much longer than wide, rounded at tip, punctate and pubescent along sides; slightly concave and smooth in center. Under side of body more densely pubescent, first segment of hind tarsus obliquely truncate, but slightly thicker than others, and about as long as fourth segment; longer than the second and third combined. Hind tibia and first tarsal segment very finely transversely ridged along dorsal edge.

Length, 4 to 7 mm.

Holotype.—Female; Western Nevada. [Leconte Collection.]

Plesiotype or Topotype.—Female; Nevada. [Horn Collection.]

The description above was made from the Holotype. The specimen in the Horn Collection taken in Nevada is identical with the type; and the drawing of the pygidium was made from this specimen, while the outline of the hind tarsus was made from the type in the Leconte Collection. The writer believes that the specimen in the Horn Collection is a true topotype since they both have the same kind of labels, and was given to Leconte by Horn. The locality label of this specimen has a red marking at its left hand side which probably indicates that it was collected in the western part of the state.

Rhipiphorus calopterus new species.

This species may be confused with species of group *fasciatus* because of the similarity in the color of the elytra, but it belongs, however, in a different group. Species of group *fasciatus* have the first segment of hind tarsus long and thin, while *Rh. calopterus* has it short and thick. From *nevadicus* it may be separated by the form of the pygidium, being longer than wide in *nevadicus* and shorter in *calopterus*. From *luteipennis* it may be separated by the antennae, the rami being long, curved and subequal in *luteipennis*, and short, straight and decreasing in length in *calopterus*. In addition to this the antenna of the latter has eleven segments, while the others have only ten.

Brown. Head and pronotum blackish; front femora with a yellowish tinge in front; elytra at base amber yellow, basal third brown, shining; wings brown, tips hyaline. Head broad, vertex broadly rounded, finely but sparsely punctate, front finely pubescent, coarsely punctate with a small median excavation in front of vertex. Antennae of female 11-segmented, pectinate, brown, processes decrease in length toward apex, first ramus longest, much shorter than the length of the eyes. Pronotum about as broad at base as long, rounded, and slightly truncate at base, finely pubescent and densely punctate with smooth glabrous area extending from disc to both sides. Elytra coarsely punctate, especially near base, humeri distinct, smooth and shining. Wings brown, tips hyaline. Under side of body sparsely pubescent, punctate, pygidium coarsely but sparsely punctate at apex, but finely and densely punctate at its dorsal angles. Apex broadly rounded, almost truncate, convex, with a small concavity at anterior margin.

First segment of hind tarsus shorter than fourth, about as long as second and third together, but thicker and obliquely truncate at apex.

Length, 5.5 mm.

Monotype.—Female; Paris, Maine, July, (C. A. Frost). [Frost Collection.]

Rhipiphorus minimus (Pierce)

1904. *Myodites minimus* Pierce, Stud. Univ. Nebr., IV, p. 159.
1920. *Myodites minimus* Pierce, Ent. News, XXXI, p. 278.

Head and thorax black, abdomen dark brownish, antennae with stalk brown, rami light brown tipped with brownish. Elytra, anterior and median legs color of antennae, posterior darker. Wings hyaline, clouded at middle with brown.

Head depressed, rather coarsely and unevenly punctate, clad with very sparse, whitish pubescence; 11-jointed, very finely punctate throughout, vertex between the antennae elevated, rounded, not carinate. Pronotum very unevenly and coarsely punctate with pubescence very sparse at base and near anterior margin; glabrous shining along sides and disc; disc not carinate and but slightly and very broadly grooved toward apex. Mesothorax with scutellum concealed; apical half coarsely punctate; posterior margin straight. Metathorax sparsely punctate; postscutellum shining, glabrous, laterally converging, apically truncate. Abdomen coarsely, sparsely, unevenly punctate; finely but sparsely pubescent. Body sparsely punctate, pubescent beneath. Elytra sparsely and shallowly punctate. Posterior tarsus with the first joint not remarkably elongate, as long as second and third joints together, but not equaling the length of fourth, apically thickened, twice as thick as succeeding joints, obliquely truncate, and emarginate behind; second joint over twice as long as third; claws as long as second joint, pectinate.

Length, 4 mm.

Type.—Male; Belmont, Nebraska. [U. S. National Museum, No. 8256.]

The type has been examined and no characteristics were found that were not mentioned in the original description and therefore it was quoted above with some changes. It was found necessary however, to make a more detailed drawing of the hind tarsus, than the one Pierce presented.

Rhipiphorus brevipes new species

The species may be distinguished from other allies by its short legs and tarsi. Pl. IV, fig. 13.

Male: Black-brown, antennae yellowish, tips darker, legs brownish-yellow, bases of femora black-brown. Elytra amber yellow, extreme base brown.

Vertex rounded, frons with two elevations between bases of antennae, clypeus elevated, emarginate and red at tip. Pronotum pubescent, two glabrous areas near base distinct, median line depressed near base. Elytra punctate, base glabrous. Median line of mesoscutellum not furrowed, smooth and elevated. Tergites pubescent, second tergite smooth, first pubescent with glabrous area in middle, third tergite pubescent on sides only. Seventh tergite with smooth areas on both sides. Pygidium (eighth tergite) pubescent with dorsal margin smooth. Legs short and compact, very robust, first segment of hind tarsus very short and thick, about as long as fourth segment, obliquely truncate and emarginate, tips lobate.

Length 4 mm.

Monotype.—Male; Rio Balsas, (Wickham). Mexico. [Museum of Comparative Zoology.]

Group scaber

1. Pygidium in the female entirely brown or dark brown.....2
   Pygidium in the female entirely, or for the greatest part yellow.....4
2. First tergite only with brown median spot; the rest are entirely yellow. **neomexicanus**
   Three or four tergites with brown median spots.....3
3. First segment of hind tarsus elevated, truncate, and shorter than all others combined. Species so far taken in Nebraska only.....**solidaginis**
   First segment of hind tarsus less elevated, about as long as fourth segment. So far taken only in New Mexico and Colorado.....**scaber**
4. Tip of pygidium brown, first segment of hind tarsus shorter than all others combined.....**semiflavus**
   Entire pygidium yellow, first segment of hind tarsus delicate, and although truncate and emarginate, very little thicker, and distinctly longer than fourth. **nomiae**

Rhipiphorus scaber (Leconte)

1852. *Myodites scaber* Leconte, Proc. Acad. Nat. Sci. Phila., v, p. 67.
1855. *Myodites scaber* Gerstäcker, Rhipiph. Col. Fam., p. 17.
1865. *Myodites scaber* Leconte, Proc. Acad. Nat. Sci. Phil., xviii, p. 96.
1880. *Myodites scaber* Leconte, Trans. Am. Ent. Soc., viii, p. 210.
1892. *Myodites scaber* Horn, Trans. Am. Ent. Soc., xix, p. 48.
1904. *Myodites scaber* Pierce, Stud. Univ. Nebr., iv, p. 183.
1920. *Myodites scaber* Pierce, Ent. News, xxxi, pp. 278 and 280.

Rh. scaber is very similar to *Rh. solidaginis* Pierce, and it is hard to separate the two. Pierce distinguished them by various characteristics but his comparison was made with a female "supposedly" of the species *scaber* Leconte, and some noteworthy errors enter into his comparison. In the first place, *Rh. scaber* has brown-black spots on the tergites the same as *Rh. solidaginis*, and the pygidium of both is very similar. The only distinct difference which may be observed is in the hind tarsi, and since it would be practically impossible to separate the two from description only, it was advisable to place the figures of the tarsi beside each other for comparison. In addition, the fact that *Rh. solidaginis* so far has been collected only in the salt basin in Nebraska and *scaber* only in the arid regions of Arizona, Colorado and New Mexico may be of assistance in separating them.

Head and thorax black. Abdomen yellow; first segment, one spot on each of

the following two or three tergites, pygidium and legs dark reddish-brown, tarsi paler. Elytra pale yellow, apical half of wings brownish, tips hyaline.

Head punctate, pubescent. Vertex rounded, finely punctate, epicranial suture slightly distinct, two distinct tubercles in front, one at base of each antennae with a deep excavation between the two, clypeus slightly emarginate. Antennae of female 10 segmented, about the length of head from vertex to clypeus; brownish, with the base of first process yellowish. Pronotum broadly rounded at tip, gradually tapering toward front, densely punctate and pubescent, with distinct narrow median line which broadens on disc into a small glabrous area, and with two small glabrous areas on each side. Elytra finely, indistinctly punctate. Abdomen finely punctured and sparsely pubescent, pygidium gradually tapering toward tip, about as long as broad, coarsely and uniformly punctate, with two very small concave smooth areas on sides. First segment of hind tarsus longer, slightly thicker than the others, obliquely truncate and emarginate at apex.

Length, 9 mm.

Holotype.—Female; New Mexico? (Woodhouse). [Leconte Collection.]

Plesiotype.—Female; Littleton, Colorado, June. [Frost Collection.]

Distribution.—Leconte described the species from one female specimen collected by Dr. Woodhouse, probably along Zuni River Creek boundary between New Mexico and Arizona. The following are his remarks about this species.

"A very imperfect specimen from the Creek boundary, which is distinguished from another Southern species having a yellow abdomen, by its much larger size, more punctured head and thorax, and immaculate black feet. I am inclined to believe that the color of the abdomen is a sexual character as in the European *M. subdipterus.*"

The locality indicated is probably along the Zuni River as we learn from the account of Dr. Woodhouse himself. The type is in poor condition and lacks the antennae. The specimen before me from Littleton, Colorado, agrees perfectly with the type in the Leconte Collection except that the epicranial suture is not distinct as in the type. The description above was made from the type and from the above-mentioned specimen. Another female in the U. S. National Museum from LaCruces, New Mexico, Sept., agrees well with the description.

Rhipiphorus solidaginis (Pierce)

1902. *Myodites solidaginis* Pierce, Can. Ent., XXXIV, p. 293.
1904. *Myodites solidaginis* Pierce, Stud. Univ. Nebr., p. 183.
1905. *Myodites solidaginis* Silvestri, Redia, III, p. 323.
1920. *Myodites solidaginis* Pierce, Ent. News, XXXI, pp. 278 and 280.

Male black, antennae, elytra and legs yellow; tips of antennae and joints between tibia and femora fuscous. Female—head and thorax black, thorax, often black-brown, abdomen reddish yellow; spots on tergites and pygidium brown, often red brown; femora and tibia brown, although the latter may be variegated with yellow, tarsi yellow brown, antennae brownish, first process yellowish. Vertex broadly rounded, finely punctate, pubescent, frons coarsely punctate and slightly concave between the eyes, clypeus finely punctate. Antennae 10-segmented, processes subequal. Pronotum broadly rounded and slightly truncate at base, coarsely and densely punctate and pubescent. Median carina at basal half and two smooth glabrous areas on either side. Distance between the two posterior areas equal to about half that between the anterior ones. Elytra irregularly punctate; scutellum punctate, divided by a median carina. Abdomen finely and sparsely punctate, second and third tergites smooth and glabrous. Pygidium of female and also the seventh tergite of male densely and coarsely punctate with two glabrous areas on both sides of center. First segment of hind tarsus elevated obliquely, truncate and emarginate at tip, as long as last segment.

Length, 9 to 10 mm.

Holotype.—Male; Lincoln, Nebraska, July 29. [U. S. National Museum, No. 8254].

Allotype.—Female; Lincoln, Nebraska, July 29. [U. S. National Museum.]

Distribution.—Pierce records this species from: Nebraska:—Pine Ridge, July; Lincoln, July 29, August 30; West Point, Aug. 3. The Holotype, Allotype and several paratypes upon which these records are based are in the collection of the U. S. National Museum; paratypes are also in the Casey Collection and in the Collection of the Academy of Natural Sciences of Philadelphia. In addition to these, specimens were examined as follows:

NEBRASKA: "Neb.," [Schaeffer Colln.], [Leng Colln.], [Palm Colln.], [A. M. N. H.]. Lincoln (Salt Basin), [Notman Colln.], Aug. 22, (Shoemaker), [Leng Colln.].

The only localities this species has been taken in, are Salt Basin in Nebraska or similar topographic places. The restriction of this species to this locality is due to the fact that its host, *Epinomia triangulifera* Vachel, is very abundant in those localities. Pierce explains also that the abundance of the species may be due to the fact that the host makes its nest in the neighborhood

of the plant upon which the triunguloid larvae feed in their earlier stages.

Rhipiphorus neomexicanus new species.

Rh. neomexicanus is closely allied to *Rh. scaber* and *Rh. solidaginis*. The male of *neomexicanus* may be distinguished from *solidaginis* in having the smooth areas on the tergites larger and more distinct, and the seventh tergite larger and opaque. The female of this species may be distinguished in having all tergites, except first two, without brown median spots. In addition, the segments of the hind tarsus differ as is shown in Plate IV, figs. 10, 11 and 12.

Male entirely black, legs, antennae and elytra yellow, tips of femora and tibia with a brownish tinge, tips of rami slightly fuscous. Vertex elevated and acute, frons flat and punctate with a small excavation between the bases of antennae, clypeus broadly truncate. Pronotum rounded at base, depressed on both sides to produce a median carina near base, entire surface is regularly punctate, with two small glabrous areas on each side of the carina. The distance between the two posterior areas is about half the distance of the two anterior areas. Elytra very finely and sparsely punctate. The second tergite and the anterior portion of third tergite glabrous, other tergites pubescent with two distinct smooth areas on the sides. The seventh tergite as broad as the two preceding together, and the smooth areas very distinct and larger than those in the other tergites. First segment of hind tarsus as long as third and fourth together, obliquely truncate and emarginate at tip.

Female head and thorax black or brownish-black. Abdomen reddish-yellow, femora brown, tibia and tarsi yellowish-brown; pygidium in greatest part brown with a yellowish tinge in the center. Elytra yellowish hyaline; wings with a smoky band in the middle. Vertex less elevated than in male, more rounded and with distinct occipital suture.

Length, 7 to 8.5 mm.

Holotype.—Male; Albuquerque, (River plain), New Mexico, August, 1921 (Rehn and Hebard). [Academy of Natural Sciences of Philadelphia, No. 8135].

Allotype.—Female; same data as type. [Academy of Natural Sciences of Philadelphia.]

Distribution.—Besides the type and allotype there is a female (paratype) in Leng's Collection also from Albuquerque.

Rhipiphorus semiflavus (Leconte)

1865. *Myodites semiflavus* Leconte, Proc. Acad. Nat. Sci. Phil., XVIII, p. 97.
1880. *Myodites semiflavus* Leconte, Trans. Am. Ent. Soc., XIX, p. 210.
1892. *Myodites semiflavus* Horn, Trans. Am. Ent. Soc., XIX, p. 48.
1904. *Myodites semiflavus* Pierce, Stud. Univ. Nebr., IV, p. 161.
1920. *Myodites semiflavus* Pierce, Ent. News, XXXI, p. 278.

"Black, finely less densely punctate, vertex obtuse, conical, apex, without carina; base of thorax round without dorsal median line; elytra shining, smooth on sides; humeral celli slightly dark, obscure, abdomen yellow, sparsely finely punctate, apex piceous, legs testaceous variegated. .30.

"Maryland, one specimen given by Rev. J. G. Morris. The antennae are wanting, the anterior feet are entirely testaceous with the base of the thighs dusky; the middle thighs are dusky, and the tibia and tarsi testaceous; the hind feet are entirely dusky, the wings have a broad smoky band near the tip."

Length, 7.5 mm.

Type.—Female; Maryland. [Leconte Collection.]

The above is a translation of the original description by Leconte, and his remarks. The type is indeed a poor specimen, and no additional notes were made from it. I had no specimens that were conspecific with it and also in the collections loaned to me later on, I find nothing that agrees with this description.

Rhipiphorus nomiae new species

This species may be distinguished from the others of this group in having the first segment of the hind tarsus thick and long as the fourth, but obliquely truncate and emarginate at tip. In addition the female is of a chocolate brown, the pygidium is entirely yellow and, in general, the species is much smaller and more delicate than the others.

Male. Head and thorax black, abdomen brownish-black. Antennae straw yellow, tips brown; legs yellow, coxa both ends of femora and tibia brownish. Elytra hyaline-yellow with a brownish tinge at base. Vertex prominent, with a carina and a distinct excavation. Pronotum punctate, sides not pubescent, disc sparsely so; base slightly truncate, with two depressions in front of it, elytra broad, punctate on sides; seventh tergite roughly punctate opaque, with two round smooth areas on side. Pygidium finer and denser punctate and opaque. Wings with a brownish tinge behind middle near costa. Hind tarsus with first segment slender and slightly longer than fourth, but shorter than all segments combined; it is very little stouter than the others but obliquely truncate and emarginate at tip.

Female differs from the male in color. Head and thorax chocolate brown. Abdomen and the pygidium entirely yellow. Wings more brownish; in one female entirely brown. Legs brown, with tarsi partly yellowish. Antennae 10-segmented; 8 rami short, subequal in length. Vertex less prominent, but with epicranial suture; pygidium almost uniformly distinctly punctate.

Length, 6 mm.

Holotype.—Male; Selma, Alabama, (Hubbard and Schwarz). [U. S. N. M., No. 41865.]

Allotype.—Female; Selma, Alabama, (Hubbard and Schwarz). [U. S. N. M.].

Paratypes.—One female with same data as type; [U. S. N. M.]. One female; "Ala," (C. F. Baker). [U. S. N. M.].

Regarding the specimens upon which this species is based, we may note a report by Dr. Leconte[12] as follows: "Mr. Schwarz collected at Selma, Alabama, a species of *Myodites*, Parasitic on *Nomia nevadensis* Cresson. The abdomen in the female is yellow, and in the male black." This female is the allotype of *Rh. nomiae*, and has a label of Dr. Schwarz, indicating its parasitism upon *Nomia*. From this label we learn also, that the name "*Myodites nomeæ*" was given to this species, but was not published. I retain, therefore, this name. Upon investigation, Mr. H. S. Barber found that the specimen of *Nomia* which Dr. Schwarz collected, and upon which the report by Leconte was based, has since become the type of *Nomia pattoni* Cockerell.

Group vierecki

Rhipiphorus vierecki (Fall)

1907. *Myodites vierecki* Fall, Trans. Am. Ent. Soc., XXXI, p. 259.
1920. *Myodites vierecki*, Pierce, Ent. News. XXXI, p. 279.
1920. *Myodites knausi* Pierce, Ent. News. XXXI, p. 279.

Female: Head and thorax black or brownish-black. Pronotum black or dark brown, with sides and base light brown or yellowish, or entirely black but extreme margins with a trace of yellow. Elytra yellow with extreme base brownish. Abdomen straw yellow. The following parts in abdomen are dark brown or black; first five tergites, tip of pygidium, first five pleurites, fourth, fifth, sixth and seventh sternites, especially at their median area. Legs pale yellow, joints brown. Head finely punctate, sparsely pubescent. Vertex rounded, nor carinate, frons, slightly concave in middle with slight convex areas on sides of this concavity. Antennae 11-segmented, about as long as head, rami very long, diminishing in length toward apex. First ramus about half the length of the entire antennae, last ramus as long as the three preceding segments together. Pronotum smooth and glabrous on disc, sparsely punctate and pubescent on sides and front, more closely punctate at base. Disc of pronotum with a distinct concavity in middle and two behind it near base. Base broadly rounded, slightly emarginate at tip. Meso-scutellum glabrous in middle and densely pubescent on both sides. Abdomen very sparsely pubescent, punctation almost indistinct. Pygidium longer than

[12] Trans. Am. Ent. Soc., VIII, Proc., p. XXIII.

broad, dorsal angles usually depressed, otherwise entirely convex. First segment of hind tarsus slightly shorter than all others combined, straight, and obliquely truncate at apex.

Male: "Length, 9 mm. Similar to the female, with the following exceptions: antennae honey-yellow, bi-flabellate, with the tips of the rami about even. The abdomen is black with the base and apex of the first ventral segment yellow, and the prepygidial area yellow, but with the pgyidium black."

Length, 9 to 11 mm.

Type.—Female; Florence, Arizona. [Fall Collection.]

Distribution.—Fall records the species from Alamogordo, New Mexico, and Florence, Arizona. Pierce records it from St. George, Utah, June 10, 1919, altitude 2800 feet, and Hurricane, June 14 at altitude 3200. (Knaus). The specimens examined by the author were as follows:

Eight paratypes of *Vierecki* Fall, all females, Alamogordo, New Mexico, May–April, and Florence, Arizona, May, in the collection of the Academy of Natural Sciences of Philadelphia and one female paratype of *Myodites Knausi* Pierce, in the Mason Collection, Academy of Natural Sciences of Philadelphia.

Variation.—The descriptions of both Fall and Pierce show that *Rh. vierecki* Fall, and *Rh. knausi* Pierce are one species. The paratypes examined also show that both authors described the same species. *Rh. vierecki* Fall, because of its priority, should be considered the proper name, and *Rh. knausi* a synonym. Pierce, in his key (1920), distinguishes the two by the characteristics of the males; he knew the male of his species but did not know the male of the species Fall described and his distinction between the two therefore is very obscure. Pierce, in his description, states also that the female antennae are ten segmented with nine rami, in other words, the second segment is in this case with a process. As far as the present writer knows, having studied this genus and allied genera and families, such can not be the case; as a matter of fact, the antennae of the female *vierecki* has eleven segments, the second being very small, closely united to the first and therefore inconspicuous. In cases where the female of a *Rhipiphorus* has only ten segments, it is the last one that disappears. *Rh. vierecki* has longer antennal rami than the other allied species; in addition to this it may be distinguished from the others by the color, shape of pygidium, and hind tarsi.

Group popenoei

1. Tergites brownish, with distinct carina. Female not known.....**rex**
   Tergites as well as sternites reddish-yellow.....2
2. Elytra fuscous.....**flaviventris**
   Elytra red-yellow. Pronotum shining.....3
3. Pronotum black, pygidium of female brown-black. (Male not known).
   laevicollis
   Pronotum with reddish tinge along sides. Pygidium of female red-yellow.
   popenoei

Rhipiphorus popenoei (Leconte)

1880. *Myodites popenoei* Leconte, Trans. Am. Ent. Soc., VIII, p. 210.
1892. *Myodites popenoei* Horn, Trans. Am. Ent. Soc., XIX, p. 48.
1904. *Myodites popenoei* Pierce, Stud. Univ. Nebr., IV, p. 161.
1920. *Myodites popenoei* Pierce, Ent. News, XXXI, p. 278.

Head, thorax, anterior part of pronotum, sides and median line, as well as median line at tip of pygidium brownish black or brown. Otherwise red-yellow. Legs yellow, coxae and proximal end of femora brown. Vertex rounded, front with distinct median excavation in front of vertex. Clypeus yellowish, emarginate and shining. Maxillary palpi yellow. Antennae of female brownish-black, slightly pale at base, rami subequal, and moderately long. Pronotum finely punctured at base, very sparsely along lateral margins, glabrous on disc where there is a distinct excavated median line. Base broadly rounded and but little broader than anterior margin. Elytra punctured, but smooth along humeri.

Length, 8.5 mm.

Type.—Female; Colorado. [Leconte Collection.]

Allo-plesiotype.—Male; Palmerlee, Arizona, August, (N. Banks). [Leng Collection.]

The above description was made from the type in the Leconte Collection. The male in the Leng Collection, agrees very well with the above description and the type. It differs, however, in the following: The pronotum is entirely black with a reddish tinge at hind angles. Hind femora and part of hind tibia brownish-black, otherwise legs and tarsi as described above. Pygidium (8th tergite) black, two spots on the 7th tergite and first sternite brownish. In addition to the above, the following should be mentioned: Antennae with rami curled longer than head, and blackish-brown. First segment of hind tarsi thicker than the others, obliquely truncate and emarginate, and as long as the two following, together; second segment slightly shorter than fourth.

Rhipiphorus flaviventris (Champion)

1891. *Rhipidophorus flaviventris* Champion, Biol. Cent.-Am., Col., IV, pt. 2, p. 361.

This species, according to Champion, may be separated from *Rh. rex* by having its tergites yellow, and from *popenoei* and *laevicollis* by having piceous elytra.

"Length, 8½ mm. (♂)."

Type.—Male; Cerro Zunil, Guatemala. [British Museum.]

Rhipiphorus laevicollis (Champion)

1891. *Rhipidophorus laevicollis* Champion, Biol. Cent.-Am., Col., IV, pt. 2, p. 360.

From the original description it would seem that this species is nearly related to *Rh. popenoei*, but may be separated by the color of thorax, which, according to Champion, is entirely black, while tinged with red in *popenoei* and by other minor characteristics stated in the descriptions.

"Length, 9 mm."

Type.—Female; Mexico. [British Museum.]

Rhipiphorus rex (Champion)

1891. *Rhipidophorus rex* Champion, Biol. Cent.-Am., Col. IV, pt. 2, p. 360.

This species may be separated from the other allied species by its carinate tergites.

"Length, 10 mm."

Holotype.—Mexico. [British Museum.]

Group aurantus

Rhipiphorus aurantus new species

Rh. aurantus differs from *Rh. mutchleri* and *Rh. simplex* in having no markings along the abdominal segments; from the other species that have a reddish-yellow abdomen, it may be separated by the form of the hind tarsus and the antennae.

Very robust. Head and prothorax black, abdomen red-yellow, first tergite brown, pygidium red-yellow with the apex and an arched line projecting toward dorsum brownish, legs brown, tarsi yellowish-brown, wings smoky. Vertex broadly rounded, slightly carinate, closely punctate; frons concave, coarsely punctate above, convex and finer punctate below. Clypeus broadly rounded, with slight emargination. Antennae short, 10 segmented, rami long, 1.5 subequal, from 5 to 8 reducing in length. Pronotum finely and uniformly punctate, median line distinct and more depressed and broad on middle disc, no distinct glabrous areas on the sides of it. Scutellum bi-lobed, a median carina dividing it into

two distinctly concave and finely punctate areas. Elytra broad at base, narrowly rounded at apex, sutural margin emarginate. Sides of metascutum sparsely punctate, abdomen broad, sides parallel, first tergite finely punctate. Second tergite smooth and glabrous, others coarsely punctate with a small smooth glabrous area on each side and in the middle. Under surface of thorax and abdomen punctate and pubescent. Pygidium coarsely punctate with two concave smooth glabrous areas in the middle. Legs comparatively short and strong, hind tibia slightly curved and distinctly longer than tarsus. First segment of hind tarsus about as long as all others together, very little thicker, but distinctly truncate and emarginate at tip.

Length, 10 mm.

Monotype.—Female; Tarrant Co., Texas, Aug. 17, 1902 (Hooker). [U. S. National Museum, No. 41864.]

The hind tarsi of this species are of a form which may be considered as an intermediate stage between those which have the first segment broad, short, and obliquely truncate; and those which have the first segment as long as all others combined. In this case the first segment of the hind tarsus is broad and obliquely truncate at apex, but is as long as all the others combined.

Group californicus

1. Main color of abdomen brown, tergites and sternites with yellowish tinge. **californicus**

   Main color of abdomen yellow with brownish markings.....2

2. First tergites with brown markings, last tergites and main color of pygidium yellow. Male not known.....**mutchleri**

   Last tergites and pygidium brown, first tergites yellow.....**simplex**

Rhipiphorus californicus (Leconte)

1880. *Myodites californicus* Leconte, Trans. Am. Ent. Soc., VIII, pp. 210–211.
1892. *Myodites californicus* Horn, Trans. Am. Ent. Soc., XIX, p. 48.
1904. *Myodites californicus* Pierce, Stud. Univ. Nebr. IV, p. 162.
1920. *Myodites californicus* Pierce, Ent. News, XXXI, p. 278.

Leconte, in his description of the species, has failed to mention that the dorsal segments of the abdomen are yellowish. This characteristic, although it varies in individuals, helps to identify it, and distinguish it from other allied species.

Head and thorax black or brown-black, elytra entirely yellow, abdomen brown, ventral segments paler, dorsal segments yellowish. Head pubescent, vertex conic, front flat or slightly concave, antennae 10-segmented, dark brown, pectinate, shorter than head, rami compact and decreasing in length toward apex. Pronotum broad and rounded at base, punctate, pubescent, with smooth areas on both sides

of distinct median line. Elytra finely, very sparsely punctate. Wings hyaline, very faintly fasciate; abdomen shining, sparsely and finely pubescent; pygidium very shining, finely punctate and pubescent along margins. Legs brown, tarsi fuscous; first segment of hind tarsi as long as all others combined.

Length, 5 to 6.5 mm.

Holotype.—Female. California. [Leconte Collection.]

Alloplesiotype.—Male; California. [Schaeffer Collection.]

Distribution.—This species is found along the Pacific Coast. There is one female in the Leng Collection from Soda Springs, Washington. The male specimen in the Schaeffer Collection agrees very well with the type of *californicus* in color and form and is no doubt its male. It has the vertex more pointed, middle and hind femora and hind tibia pale brown, front legs and all tarsi and antennae straw yellow, thorax dark brown; this male was taken in California. There is one specimen (Homotype) in the Leconte Collection which is placed alongside the type of *Rh. nevadicus*, and labeled "*nevadicus*" but is without doubt wrongly determined, as upon examination and comparison I find this specimen to be a true *californicus*. It was taken in Washington Territory.

Rhipiphorus mutchleri new species

The nearest ally of this species is *Rh. californicus*. It differs from that in having the dominant color of the abdomen yellow, whereas in *californicus* it is brown: the tibiae of *Rh. mutchleri* are curved and broad; and in general it is a larger species than *Rh. californicus*.

Head and thorax black, abdomen and elytra yellowish-red, legs, tip of pygidium and some small areas along dorsal margins of sternites and spots on first two or three tergites brownish-black; front legs and all tarsi yellow, legs otherwise brownish. Head punctate, sparsely pubescent, vertex rounded, punctate, with suture or small carina; front slightly concave, clypeus truncate or slightly emarginate. Antennae 10-segmented, short, pectinate, rami decreasing in length toward apex. Pronotum punctate, with smooth median line and two shining areas on each side, base broadly rounded. Elytra broad, entirely yellow, shining, finely punctate. Wings hyaline, with smoky band along the middle. Pygidium broad, triangular, punctate along sides, smooth and usually concave in middle, although this concavity may be obsolete. First segment of hind tarsus as long as the others combined and slightly thicker than the others.

Length, 6 to 7.5 mm.

Holotype.—Female, Ormsby County, Nevada, July, (Baker). [American Museum of Natural History.]

Distribution.—The description was made from five females collected by Baker, Ormsby Co., Nevada. Four of these, including the Holotype, are from the Charles Palm Collection, American Museum of Natural History. One is in the U. S. National Museum, Washington, No. 41866, and one female in the Schaeffer Collection labeled "Cal."

Variation.—The amount of brownish-black along the dorsal margin of the sternites varies in the individuals. In some the spots are confluent with each other. In others they are small. In some individuals only the first two tergites have brown patches while in others four or five are marked with brown. The color of the legs is not of great specific value since it varies in individual specimens.

It gives me much pleasure to name this species in honor of Mr. Andrew J. Mutchler who has always been ready to offer helpful suggestions and advice regarding this paper in the course of its preparation.

Rhipiphorus simplex (Champion)

1891. *Rhipidophorus simplex* Champion, Biol. Cent.-Am., Col., IV, pt. 2, p. 263.

This species may be distinguished from *Rh. mutchleri* by its brown pygidium and brown patches on the last tergite. In *Rh. mutchleri* the pygidium is in great part yellow, and the first tergites are with brown spots, the latter being entirely yellow.

Head and prothorax black, abdomen reddish-yellow, pygidium, entire 6th tergite and small patches on other tergites brownish; elytra yellow with extreme base and small patch at apex brownish-yellow, femora, tips of middle and hind tibia dark brown, apical half of front femora and tibia with basal halves of middle and hind tibia and tarsi yellowish, antennae yellowish-brown. Wings hyaline-yellow, subcosta brown-black, with smoky area at its end. Vertex very slightly elevated, its anterior face distinctly excavated, frons very finely punctured and pubescent. Antennae 10-segmented, shorter than head and twisted, rami short and subequal in length. Pronotum finely pubescent, with a median line at its anterior half, and one oblique glabrous area on either side of disc near the middle, and one on either side of disc near the base; the distance between the two posterior areas slightly smaller than that between the anterior ones. Elytra finely punctate, their apices shining. Thorax beneath finely and densely pubescent, abdomen more sparsely so. Pygidium "heart-shaped," concave, shining, very sparsely pubescent,

indistinctly punctate. Hind tibia longer than tarsus, first segment of hind tarsus straight, as long as others combined and slightly thicker.

Length, 6.5 mm.

Type.—Female; Ventannes in Durango, Mexico, (Forrer). [British Museum.]

Plesiotype.—Female; La Providencia Obispo, Guatemala, (M. Ronillard). [U. S. National Museum.]

The above description was made from the plesiotype in the U. S. National Museum.

Variation.—Two females in the Schaeffer Collection collected in Brownsville, Texas, agree in all respects with the description and the specimen from Guatemala but differ as follows: The abdomen is yellow but the following parts are brown; pygidium, 6th and 5th tergite in their entire width, a broad patch on the fourth tergite, sides of last two sternites and in one of them a small spot on third tergite. Legs are usually darker, wings with a smoky band along the entire width, and base of elytra reddish-brown.

Group fasciatus[13]

1. Wings smoky 2
   Wings hyaline 5
2. Wings smoky brown to the tip; elytra for greatest part blackish; vertex elevated. **zeschi** and **schwarzi**
   Wings hyaline with smoky band 3
3. Elytra piceous, abdomen with yellowish membrane between first tergites .. **niger**
   Elytra yellow 4
4. Elytra entirely yellow ..... **tuberculatus**
   Elytra yellow, base dark brown ..... **fasciatus**
5. Elytra piceous with yellowish markings ..... **washi, hyalinus** and **stylopides**
   Elytra yellow—with small brownish spot ..... **iridescens**

Rhipiphorus hyalinus (Champion)

1891. *Rhipidophorus hyalinus* Champion, Biol. Cent.-Am., Col., IV, pt. 2, p. 363.

Champion remarks upon this as follows: "This is much smaller than any of the other species here described, and is readily separ-

[13] In this group are included those species in which both sexes are entirely brown or black. Although the author has studied the types of Leconte, and has examined several specimens, he feels uncertain about the validity of the species included in this group. He, therefore, leaves the entire group unaltered, until further study may throw more light upon it. The key is based upon the description, since most of the species included were not available for examination nor could be identified from the original description.

able from all of them by its hyaline wings. The vertex has a short compressed tubercle in the middle. The head is exceedingly broad. The rami of the antennae are very slender. *R. hyalinus* agrees in some respects with Leconte's description[14] of the North-American R. stylopides (Newm.), but it is evidently distinct from that species."

"Length, 2¾ mm."

Type.—Cordova, Mexico. [British Museum.]

Rhipiphorus iridescens new species

This species differs from *hyalinus*, the pronotum having no median line and being differently sculptured; also the elytra in *Rh. iridescens* are yellowish while brownish in *hyalinus*. It differs from *stylopides* in color of elytra and from *walshi* and others in size, color of elytra and color of wings.

Blackish; antennae fuscous, elytra pale with base and patch at sutural margin near apex brownish, femora brownish, tibia and tarsi slightly paler. Wings hyaline, iridescent; costa hyaline, or slightly fuscous.

Frons flat, vertex small, acute, and tuberculate, with small erect whitish hair. Clypeus slightly emarginate. Pronotum roughly punctate with two oblique, smooth areas on the sides, connected with each other on the disc. Base rounded and slightly truncate. Elytra rounded at apex, punctate on sides only. Tergites, with the exception of first and second and part of third, roughly punctate, with very short hair. 7th tergite with two small depressions but not smooth; pygidium (8th tergite in the male) smooth and glabrous on dorsal margin, punctate and clad with erect pubescent. Hind tarsus with first segment as long as the others combined, thin and straight.

Female like male; differs from it only in secondary sexual characteristics as follows: Vertex less prominent but carinate; antennae 10-segmented, with 8 rami. Third ramus slightly longer than others, the last three are fused, pygidium (7th tergite in female) elongate, acutely rounded, concave and smooth in center.

Length, 4 mm.

Holotype.—Male; ElPaso, Texas, July 11, 1917, (Jos. Bequaert). [American Museum of Natural History.]

Allotopotype.—Female; same data as holotype. [American Museum of Natural History.]

[14] Proc. Acad. Phil. xvii. p. 97.

Rhipiphorus walshi (Leconte)

1865. *Myodites walshi* Leconte, Proc. Acad. Nat. Sci. Phila., XVIII, p. 97.
1880. *Myodites walshi* Leconte, Trans. Am. Ent. Soc., VIII, p. 210.
1892. *Myodites walshi* Horn, Trans. Am. Ent. Soc., XIX, p. 48.
1904. *Myodites walshi* Pierce, Stud. Univ. Nebr., IV. p. 162.
1920. *Myodites walshi* Pierce, Ent. News, XXXI, p. 278.

Antennal rami little curled and slightly darker at apex. Median line slightly distinct at base, and in addition to the two larger oblique smooth areas on both sides of disc, there are two smaller glabrous areas near base; two such areas are also on each of the tergites from the fifth to the seventh. The first tergite is entirely smooth, while the second to sixth have a smooth glabrous area in the middle The mesoscutellum is rugulose and with a distinct median carina; the elytra are rather finely rugulose and not punctate, base fuscous, apex amber yellow with a fuscous spot.

Length, 5 mm.

Holotype.—Male; Illinois. [Leconte Collection.]

Distribution.—Illinois, New Jersey, New York, North Carolina.

I have before me one male from Hewitt, New Jersey, which agrees very well with the type. The above additional description is made from this Homotype:

Rhipiphorus stylopides (Newman)

1838. *Myodites stylopides* Newman, Ent. Mag., V, p. 376.
1880. *Myodites stylopides* Leconte, Trans. Am. Ent. Soc., VIII, p. 210.
1892. *Myodites stylopides* Horn, Trans. Am. Ent. Soc. XIX, p. 48.
1904. *Myodites stylopides* Pierce, Stud. Univ. Nebr., IV, p. 162.
1920. *Myodites stylopides*, Pierce, Ent. News, XXXI, p. 278.

Many different specimens from different localities agree with the short description of Newman, and it is hard to say which is the true *stylopides.*

Length, 3.5 mm.

Type.—Unknown; Alton, Illinois.

Rhipiphorus tuberculatus (Champion)

1891. *Rhipidophorus tuberculatus* Champion, Biol. Cent.-Am., Col., IV, pt. 2, p. 362.

Champion remarks upon this species as follows: "This species differs from all the others here described by the strongly raised, very stout, blunt tubercle on the vertex in the male sex, this tubercle being replaced in the female by an angular elevation. The abdomen is thickly and finely punctured. The angular elevation on the vertex of the female will easily distinguish *R. tuberculatus* from the same sex of the closely allied *R. simplex;* the latter, moreover, has an angular prominence beneath the point

of insertion of each antenna, of which there is no trace in *R. tuberculatus.*"

"Length, 4½ to 5½ mm. (♂ ♀.)"

Holotype.—Male; Atoyac in Vera Cruz, Mexico. [British Museum.]

Allotopotype.—Female. [British Museum.]

Rhipiphorus niger (Waterhouse)

1875. *Myodites niger* Waterhouse, Cist. Ent., I, p. 369.
1891. *Rhipidophorus niger* Champion, Biol. Cent.-Am., Col., IV, pt. 2, p. 369.

"Length, 5¼ mm."

Type.—Female; Dueñas, Panzos, Guatemala, [British Museum.]

Plesiotype.—Male; Orizaba, Mexico, (Champion). [British Museum.]

Rhipiphorus zeschi (Leconte)

1880. *Myodites zeschi* Leconte, Trans. Am. Ent. Soc., VIII, pp. 210–211.
1881. *Myodites zeschi* Leconte, Bull. Buff. Soc., IV, p. 28.
1892. *Myodites zeschi* Horn, Trans. Am. Ent. Soc., XIX, p. 48.
1904. *Myodites zeschi* Pierce, Stud. Univ. Nebr. IV, p. 162.
1920. *Myodites zeschi* Pierce, Ent. News, XXXI, p. 278.

Leconte expressed his opinion that this may be the male of *Rh. schwarzi*, and he described it as a new species only because of the distant locality it was taken in. Later authors sank this in synonymy with *Rh. schwarzi.* I do not know whether this is justified or not; the best way this may be settled is by comparing two that were caught *in coito* and see whether they agree with the types of Leconte. I therefore consider this as a valid species for the present.

Length, 6.5 mm.

Type.—Male; Buffalo, New York. [Leconte Collection.]

Rhipiphorus schwarzi (Leconte)

1880. *Myodites schwarzi* Leconte, Trans. Am. Ent. Soc., VIII, pp. 210–211 and Proc., p. XXIII.
1892. *Myodites schwarzi* Horn, Trans. Am. Ent. Soc., XIX, p. 48.
1904. *Myodites schwarzi* Pierce, Stud. Univ. Neb. IV, p. 162.
1920. *Myodites schwarzi* Pierce, Ent. News, XXXI, p. 278.

The best characteristics to distinguish this from *walshi* are as follows: *schwarzi* has the elytra entirely blackish-brown with a reddish patch near the suture, while *walshi* has the base only

blackish. The wings in *schwarzi* are smoky black to the apex, whereas they are hyaline, slightly smoky, in *walshi*. In general this latter is a smaller and more delicate species.

Length, 6 mm.

Type.—Male; Sumter County, Florida, [Leconte Collection.]

One female (Homotype) from Monticello, Florida, in the collection of the American Museum of Natural History, agrees very well with the type.

Host recorded.—Augochlora pura Say.

Rhipiphorus fasciatus (Say)

1823. *Dorthesia fasciata* Say, Jour. Acad. Phila., III, p. 274.
1855. *Myodites fasciatus* Gerstäcker, Rhipiph. Col. Fam., p. 17.
1880. *Myodites fasciatus* Leconte, Trans. Am. Ent. Soc., VIII, p. 210.
1892. *Myodites fasciatus* Horn, Trans. Am. Ent. Soc., XIX, p. 48.
1904. *Myodites fasciatus* Pierce, Stud. Univ. Nebr., IV, p. 162.
1920. *Myodites fasciatus* Pierce, Ent. News., XXXI, p. 278.

variety:

1904. *Myodites fasciatus brunea* Pierce, Stud. Univ. Nebr., IV, p. 162.

In the collections the author has studied, various specimens bear the label "*M. fasciatus* Say," but it is still a question as to which of those is the real species of Say described from "Missouri."

Length, 8 mm.

Doubtful Species

Rhipiphorus flavicornis Say

1823. *Dorthesia flavicornia* Say, Jour. Acad. Phil., III, p. 274.

"Black, antennae bright yellow, elytra dark piceous with a common pale spot. Pa."

Rhipiphorus americanus Guérin

1835. *Myodites americanus* Guérin, Gen. Ins., fasc. 1, n. 2, t. 2.

"Nigra, scabra, parce pilosa; os ferruginea elytrorum apicis albidii; metolae hyaline iridescentes, costa fusca. N. Am."

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Explanation of Plates

PLATE I.

Pelectoma (*P. flavipes*).

Fig. 1 A.—Side view of head and prothorax.
Fig. 1 B.—Front view of head (male).
Fig. 1 C.—Antennae of female.

Trigonodera (*T. schaefferi*).

Fig. 2 A.—Side view of head and prothorax.
Fig. 2 B.—Front view of head (male).
Fig. 2 C.—Antennae of female.

Toposcopus (*T. wrighti*).

Fig. 3 A.—Side view of head and prothorax.
Fig. 3 B.—Front view of head (male).
Fig. 3 C.—Antennae of female.

Rhipidius (sp.?).

Fig. 4 A.—Side view of head and prothorax.
Fig. 4 B.—Front view of head.

Macrosiagon (*M. dimidiatum*).

Fig. 5 A.—Side view of head and prothorax.
Fig. 5 B.—Front view of head (female).
Fig. 5 C.—Antennae: *a*, female; *b*, male.

Rhipiphorus (*R. soligaginis*).

Fig. 6 A.—Side view of head and prothorax.
Fig. 6 B.—Front view of head (female).
Fig. 6 C.—Antennae: *a*, female; *b*, male.

PLATE II.

Fig. 1 M.—Male genitalia of *Pelecotoma* (*P. flavipes*).
l. lateral view; *d*. dorsal view.
Fig. 2 M.—Male genitalia of *Trigonodera* (sp.).
Fig. 2 F.—Female genitalia of *Trigonodera* (sp.).
l. lateral view; *d*. dorsal view; *v*. ventral view.
Fig. 3 M.—Male genitalia of *Toposcopus* (*T. wrighti*).
l. lateral view; *v*. ventral view.
Fig. 5 M.—Male genitalia of *Macrosiagon* (*M. limbatum*).
l. lateral view; *d*. dorsal view.

Fig. 5 F.—Female genitalia of *Macrosiagon* (*M. dimidiatum*).
l. lateral view of ovipositor in the tube; *d.* dorsal view of ovipositor with the tube removed.
Fig. 6 M.—Male genitalia of *Rhipiphorus* (*R. solidaginis*).
l. lateral view; *d.* dorsal view.
Fig. 6 F.—Female genitalia of *Rhipiphorus* (*R. solidaginis*).
d. dorsal view: (upper figure) with the ovipositor protruding; (lower figure) the ovipositor is shown in the tube and portion of the eighth tergite is cut off.
Fig. 7 M.—Male genitalia of *Evaniocera* (*E. dafouri*).
Fig. 7 F.—Female genitalia of *Evaniocera* (*E. dafouri*).
l. lateral view; *d.* dorsal view; *v.* ventral view.

PLATE III.

Trigonodera (sp.).

Fig. 2 W.—Wing.

Rhipidius (sp.).

Fig. 4—Female.
Fig. 4 A′.—Female: side view of head and prothorax.
Fig. 4 B′.—Female: front view of head.
Fig. 4 V.—Male: side view of metathorax and abdomen.
Fig. 4 W.—Male: wing.

Macrosiagon (*M. dimidiatum*).

Fig. 5 Vv.—Abdomen: section at base, showing first tergite (*1t*) and first sternite (*1s*).
Fig. 5 Vl.—Lateral view of entire abdomen.
Fig. 5 W.—Wing.

Rhipiphorus (*R. solidaginis*).

Fig. 6 Vv.—Abdomen of female: ventral view showing ventral position of the seventh tergite (*7t*).
Fig. 6 Vl.—Lateral view of female abdomen.
Fig. 6 W.—Wing.

Evaniocera.

Fig. 7 W.—Wing.

Macrosiagon fernaldi.

Fig. 14 B.—Front view of head of male.
Fig. 14 a.—Antennae of female.

Macrosiagon flavipenne.

Fig. 15 a.—Antennae of female.

Macrosiagon octomaculatum.

Fig. 16 O.—Occiput, showing suture.
Fig. 16 t.—Lateral and dorsal views of hind tarsus.

Macrosiagon pectinatum.

Fig. 17 O.—Occiput.

Macrosiagon sayi.

Fig. 18 t.—Lateral and dorsal views of hind tarsus.

PLATE IV.

Fig. 1 a.—*Rhipiphorus calopterus.* Female antennae.
Fig. 1 p.—*Rhipiphorus caloptera.* Pygidium.
Fig. 1 t.—*Rhipiphorus calopterus.* Lateral view of hind tibia and tarsus.
Fig. 2 p.—*Rhipiphorus nevadicus.* Pygidium.
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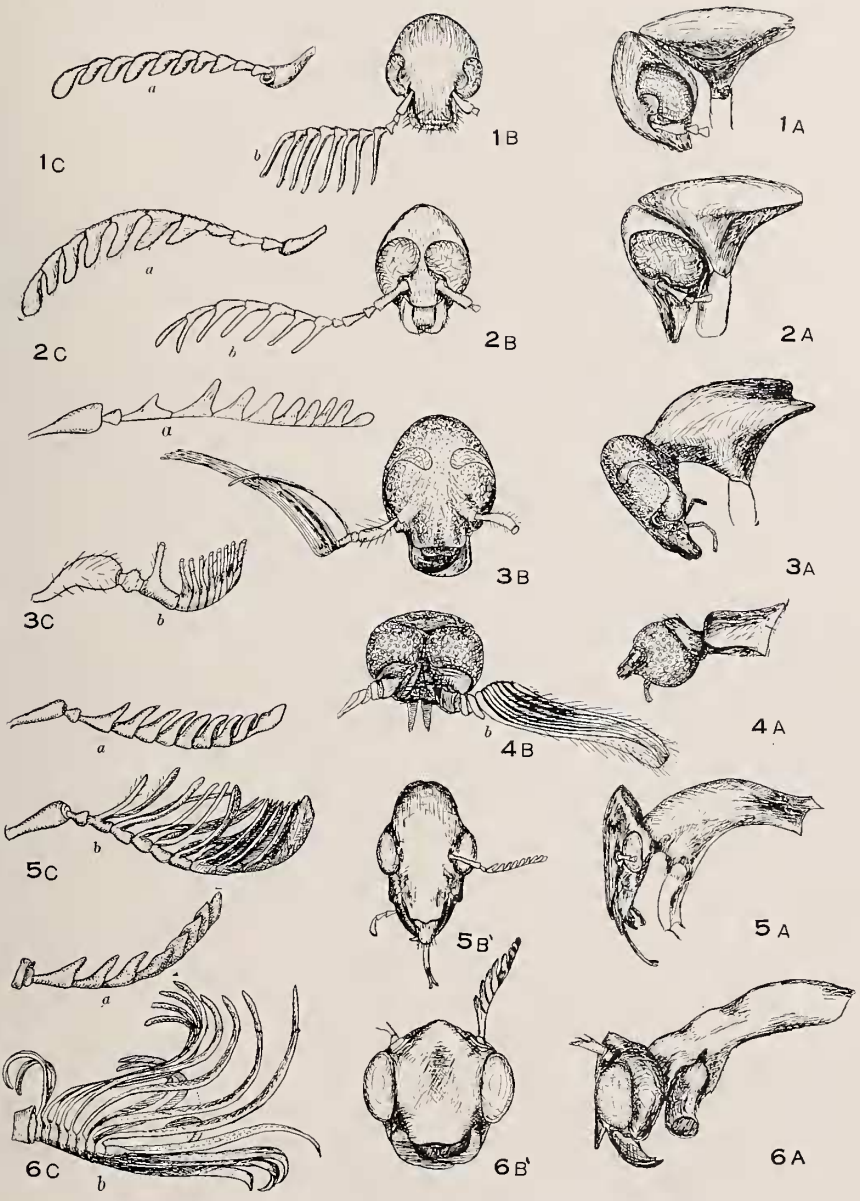
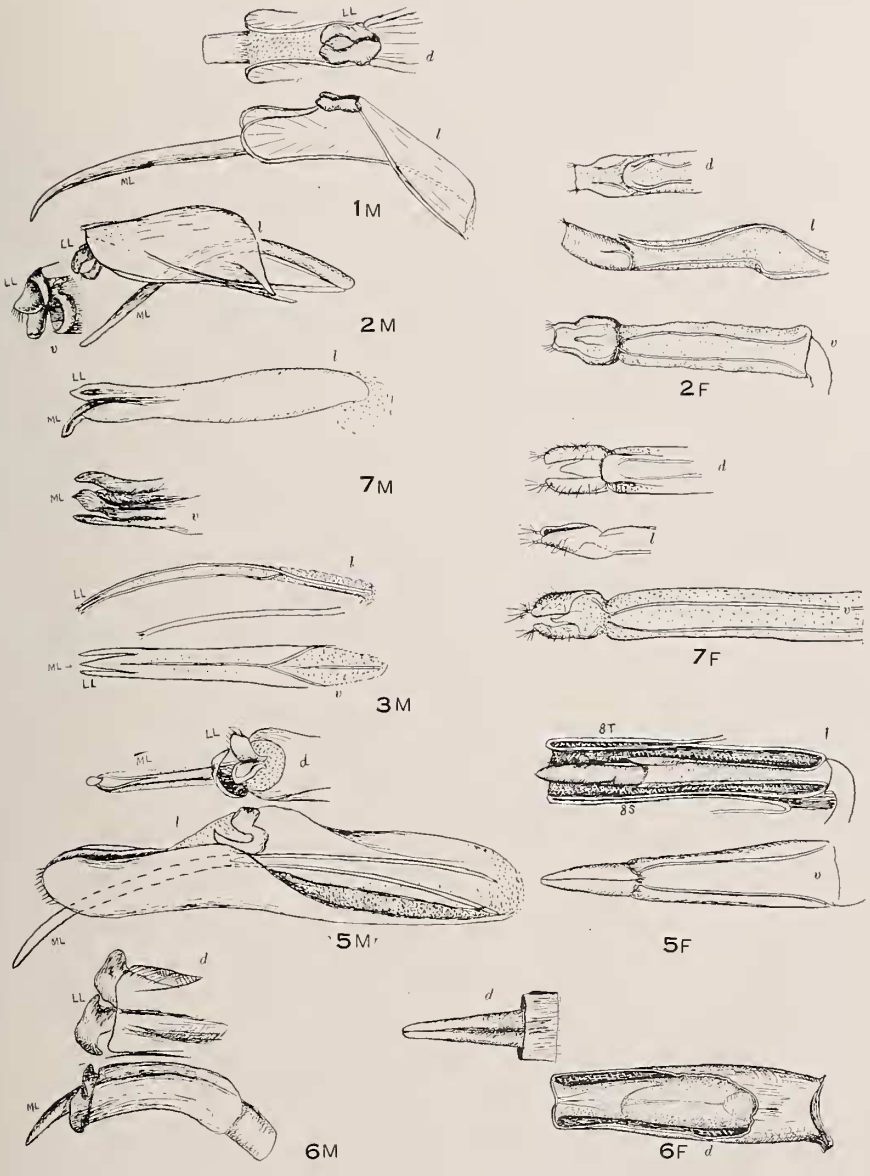
Fig. 3 a.—*Rhipiphorus luteipenne.* Female antenna.
Fig. 3 p.—*Rhipiphorus luteipenne.* Pygidium.
Fig. 4 p.—*Rhipiphorus mutchleri.* Pygidium.
Fig. 4 t.—*Rhipiphorus mutchleri.* Lateral view of hind tarsus.
Fig. 5 t.—*Rhipiphorus californicus.* Lateral view of hind tarsus.
Fig. 6 p.—*Rhipiphorus aurantus.* Pygidium.
Fig. 6 t.—*Rhipiphorus aurantus.* Lateral view of hind tibia and tarsus.
Fig. 7 p.—*Rhipiphorus vierecki.* Pygidium.
Fig. 7 t.—*Rhipiphorus vierecki.* Lateral view of hind tibia and tarsus.
Fig. 8 t.—*Rhipiphorus minimus.* Lateral view of hind tarsus.
Fig. 9 t.—*Rhipiphorus nomiae.* Lateral view of hind tarsus.
Fig. 10 t.—*Rhipiphorus solidaginis.* Dorsal and lateral views of hind tarsus.
Fig. 11 t.—*Rhipiphorus scaber.* Dorsal and lateral views of hind tarsus.
Fig. 12 t.—*Rhipiphorus neomexicanus.* Dorsal and lateral views of hind tarsus.
Fig. 13 t.—*Rhipiphorus brevipes.* Dorsal and lateral views of hind tarsus.



RIVNAY—AMERICAN RHIPIPHORIDAE



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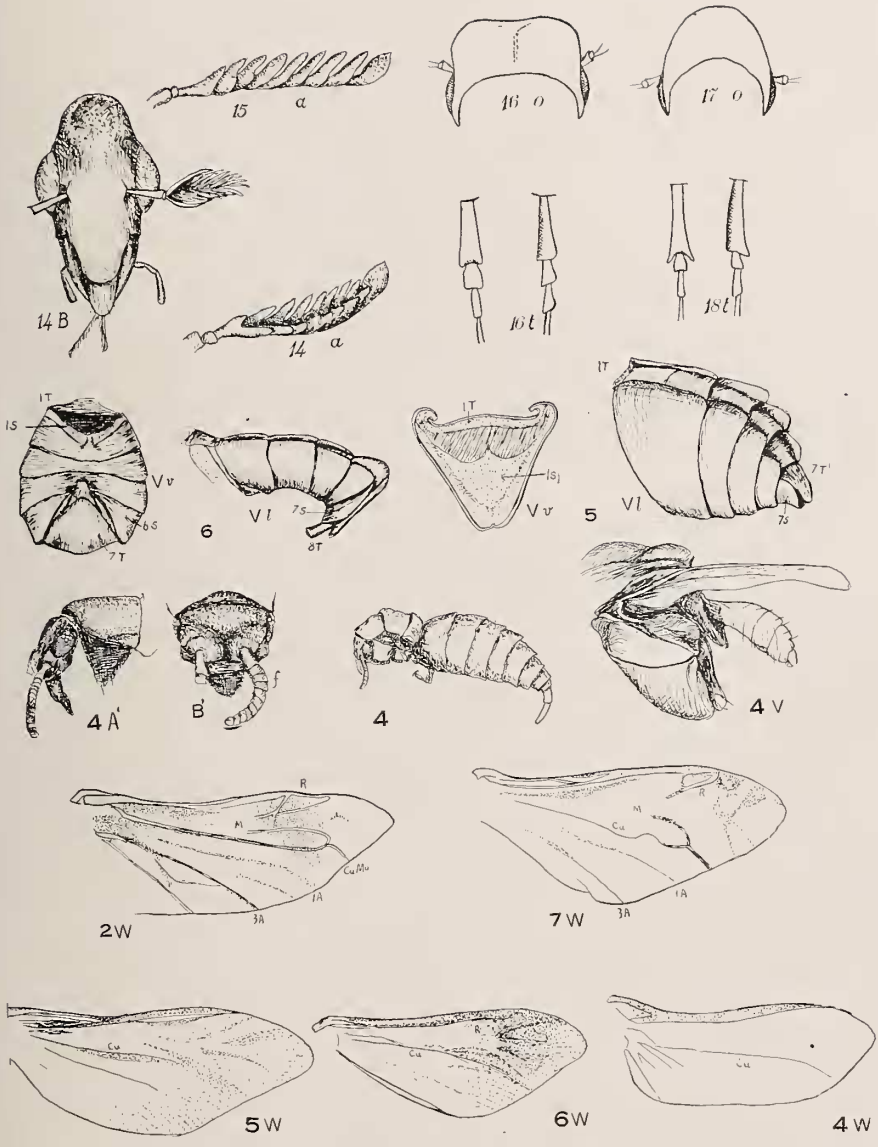

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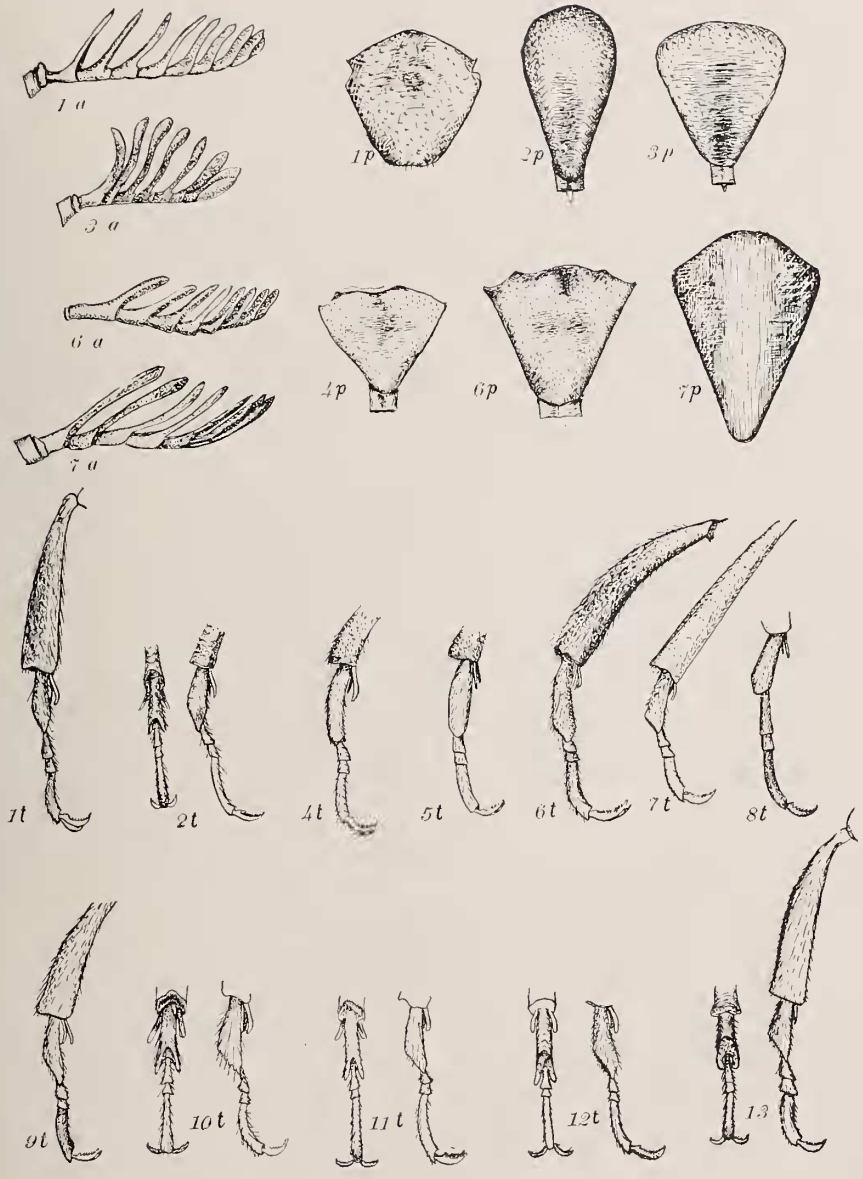

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Names quoted in synonymy are given in *italics*.